Mätinstrument 3

HARMONIC ANALYSERS

MPR63-10 **Sid. 3**

NETWORK ANALYSERS

MPR53CS-96 **Sid. 7**

NETWORK ANALYSERS

MPR53S-DIN **Sid. 7**

REACTIVE POWER CONTROLLERS

RG-8BS **Sid. 11**

MULTIMETERS

EPM-06CS-96 **Sid. 16**

MULTIMETERS

EPM-06C-DIN **Sid. 16**

POWER & ENERGYMETERS

EPR-04S-96 **Sid. 19**

POWER & ENERGYMETERS

EPR-04S-DIN **Sid. 19**

DIGITAL ENERGY COUNTER

ES-32L **Sid. 20**

DIGITAL ENERGY COUNTER

ES-25N **Sid. 20**

MPR-SW / REMOTE MONITORING SOFTWARE

MPR-SW **Sid. 22**

VOLTMETERS

EVM-3S & EVM-R3C **Sid. 24**

AMMETERS

ENT CT-25

EPM-4P & EPM-R4D **Sid. 26**

COS METER

ECR-3-96 **Sid. 29**

FREQUENCY METER

EFC-3-72 **Sid. 29**

VOLTAGE & CURRENT TRANSDUCERS

TV-111 **Sid. 30**

OVERCURRENT PROTECTION RELAYS

CKR-93T **Sid. 31**

CT-25-L.V.CURRENT TRANSFORMERS

Sid. 35

L.V. POWER CAPACITORS

Sid. 34

L.V. CURRENT TRANSFORMERS

Sid. 35

PROSWEDE-elab
Industrigatan 4, 212 14 Malmö Tel 040-38 15 70 Fax 040-38 15 78. Webbutik: www.proswede-elab.se

CERTIFICATES & APPROVALS

KEMA

KEMA KEUR

CERTIFICATE

KEMA No.: 2081831.01

Issued to:
Applicant:
Entes Elektronik A.S.
Y. Dudullu Org. San. Bolgesi And Sitesi 6
34775, ÜMRANIYE-YSTANBUL, Turkey

Manufacturer/Licensee:
Entes Elektronik A.S.
Y. Dudullu Org. San. Bolgesi And Sitesi 6
34775, ÜMRANIYE-YSTANBUL, Turkey
Product(s) : universal-meters

Trade name(s) : ENTES
Type(s)/model(s) : EPM-04, EPM-05, EPM-06, EPM-4D, EPR-04S, EVM-3 and MPR-53S

The product and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

KEMA hereby declares that the above-mentioned product has been certified on the basis of:
– a type test according to the standard EN 61010-1
– an inspection of the production location according to CENELEC Operational Document CIG 021
– a certification agreement with the number 2015760

KEMA hereby grants the right to use the KEMA-KEUR certification mark.

KEMA KEUR

The KEMA-KEUR certification mark may be applied to the product as specified in this certificate for the duration of the KEMA-KEUR certification agreement and under the conditions of the KEMA-KEUR certification agreement.

This certificate is issued on: May 10, 2005

G.H. Wensink
Certification Manager

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KEMA Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 5185, 6802 ED Arnhem, The Netherlands
Telephone +31 26 3 56 20 00, Telefax +31 26 3 52 58 00
Website: www.kema.com

ACCREDITED BY THE DUTCH COUNCIL FOR ACCREDITATION

KEMA

KEMA KEUR

CERTIFICATE

KEMA No.: 2015760.02

Issued to:
Applicant:
Entes Elektronic Cihazlar
Imalat Ve Ticaret A.S.
Yukari Dudullu Organize Sanayi
ÜMRANIYE-YSTANBUL, TURKEY

Manufacturer/Licensee:
Entes Elektronic Cihazlar
Imalat Ve Ticaret A.S.
Yukari Dudullu Organize Sanayi
ÜMRANIYE-YSTANBUL, TURKEY

Product : panelmeter

Trade name(s) : ENTES
Type(s)/model(s) : EVM

The product and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

KEMA hereby declares that the above-mentioned product has been certified on the basis of:
– a type test according to the standard IEC 61010-1 2001
– an inspection of the production location according to CENELEC Operational Document CIG 021
– a certification agreement with the number 2015760

KEMA hereby grants the right to use the KEMA-KEUR certification mark.

KEMA KEUR

The KEMA-KEUR certification mark may be applied to the product as specified in this certificate for the duration of the KEMA-KEUR certification agreement and under the conditions of the KEMA-KEUR certification agreement.

This certificate is issued on: April 12, 2002

B.B. van Leeuwen
Certification Manager

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ACCREDITED BY THE DUTCH COUNCIL FOR ACCREDITATION

KEMA

KEMA KEUR

CERTIFICATE

KEMA No.: 2015760.01

Issued to:
Applicant:
Entes Elektronic Cihazlar
Imalat Ve Ticaret A.S.
Yukari Dudullu Organize Sanayi
ÜMRANIYE-YSTANBUL, TURKEY

Manufacturer/Licensee:
Entes Elektronic Cihazlar
Imalat Ve Ticaret A.S.
Yukari Dudullu Organize Sanayi
ÜMRANIYE-YSTANBUL, TURKEY

Product : panelmeter

Trade name(s) : ENTES
Type(s)/model(s) : EPM

The product and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

KEMA hereby declares that the above-mentioned product has been certified on the basis of:
– a type test according to the standard IEC 61010-1 2001
– an inspection of the production location according to CENELEC Operational Document CIG 021
– a certification agreement with the number 2015760

KEMA hereby grants the right to use the KEMA-KEUR certification mark

KEMA KEUR

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5229

TÜRKAK

KALİTE YÖNETİM SİSTEMİ BELGESİ

QUALITY MANAGEMENT SYSTEM CERTIFICATE

MGMT. SYS. RvA C 413

TÜRK STANDARDLARI ENSTİTÜSÜ
bu belge ile

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET A.Ş.
YUKARI DUDULLU ORG. SAN. BÖLG. AND SİTESİ NO:6
34775 ÜMRANİYE- İSTANBUL / TÜRKİYE

kuruluşunun TS EN ISO 9001:2000 şartlarına uygun bir KALİTE YÖNETİM SİSTEMİNE sahip olduğunu onaylar.

Belge kapsamı Ek'te verilmiştir.

K - Q
TSE-ISO-EN
9000

TÜRK STANDARDLARI ENSTİTÜSÜ
TURKISH STANDARDS INSTITUTION

TSE GENEL SEKRETERİ
Secretary General of TSE
Mustafa GÖÇ

TSE BAŞKANI
President of TSE
Kenan MALATYALI

TURKISH STANDARDS INSTITUTION
hereby certifies that the organisation

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET A.Ş.
located in
YUKARI DUDULLU ORG. SAN. BÖLG. AND SİTESİ NO:6
34775 ÜMRANİYE- İSTANBUL / TÜRKİYE

has a QUALITY MANAGEMENT SYSTEM which fulfills the requirements of the TS EN ISO 9001:2000

Scope of the certificate is given in appendix.

Belge No / Certificate No
KY-502-05/KG-97
Belge Tarihi / Date of Certificate
28/09/2004
Geçerlilik Tarihi / Valid Until
28/09/2009

Türk Standardları Enstitüsü Türk Akreditasyon Kurumu TÜRKAK ve Hollanda Akreditasyon Konseyi RvA tarafından akredite edilmiştir.
Turkish Standards Institution, has been accredited by the Turkish Accreditation Agency TÜRKAK and the Dutch Accreditation Council RvA.

Bu belge belgelendirme şartlarına uygunluk sağlandığı sürece geçerlidir. This certificate is valid provided that compliance with the certification requirement is maintained.

Vi förbehåller oss rätten till ändringar i denna katalog utan särskilt meddelande

NETWORK ANALYSER

MPR-50 / MPR-52S / MPR-60S / MPR-63

MPR-63

Modbus / Ethernet Gateway

General

- **MPR-50** : Network Analyser.
- **MPR-52S-10** : Network Analyser with THD measurement, RS-485 (MODBUS) and Alarm Contact.
- **MPR-60S**: Network Analyser with THD measurement, RS-485 (MODBUS), Alarm Contact and 1MB Memory.
- **MPR-63**: Network Analyser with THD, up to 31th Harmonics measurement, RS-485 (MODBUS), Alarm Contact and 1MB Memory.
- IEC 61000-6-2, IEC 61000-6-4, IEC 61010-1

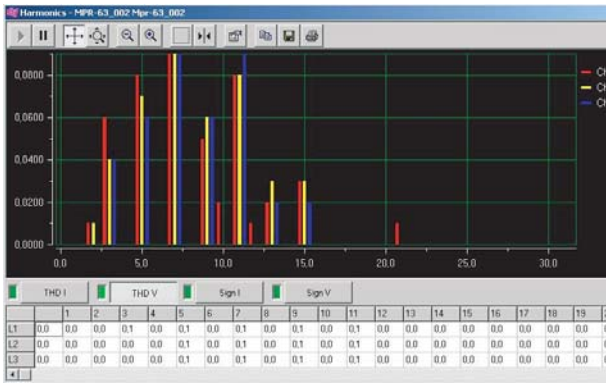
Modbus
Memory
Analogue Output
Max. Dem
Harmonics
Digital Input
Alarm Contact

Product Code	% THD I, THD V	2-31th Harmonics	I neutral	Alarm Contact	Digital Input	Energy Pulse Output	RS-485 Comm.	0(2)-10V	0(4)-20mA	Memory	Real Time Clock	LCD Display
MPR-50			●									●
MPR-52S-10	●		●	●	●		●					●
MPR-60S	●		●	●		●	●			●	●	●
MPR-60S-10	●		●	●	●		●			●	●	●
MPR-60S-20	●		●	●	●		●	●		●	●	●
MPR-60S-21	●		●	●		●	●	●		●	●	●
MPR-60S-40	●		●	●	●		●		●	●	●	●
MPR-60S-41	●		●	●		●	●		●	●	●	●
MPR-63	●	●	●	●		●	●			●	●	●
MPR-63-10	●	●	●	●	●		●			●	●	●
MPR-63-20	●	●	●	●	●		●	●		●	●	●
MPR-63-21	●	●	●	●		●	●	●		●	●	●
MPR-63-40	●	●	●	●	●		●		●	●	●	●
MPR-63-41	●	●	●	●		●	●		●	●	●	●

PC Interface Software (MPR-SW) :
MPR-SW is a graphic based software, which enables remote monitoring via internet or intranet.

Please refer to page 20 for MPR-SW Software.

Front Panel View



Harmonics View (for MPR-63)

Phase - Neutral Voltages (V_{LN})	Neutral Current	Active Power (P)	Active Energy - Import (kWh)
Phase - Phase Voltages (V_{LL})	Total Current (I)	Reactive Power (Q)	Active Energy - Export (kWh)
Average Phase - Neutral Voltage	Power Factor (P.F)	Apparent Power (S)	Reactive Energy - Capacitive (kVArh)
Average Phase - Phase Voltage	Cos	Total Active Power (P)	Reactive Energy - Inductive (kVArh)
Max. Demand	Frequency (Hz)	Total Reactive Power (Q)	
Phase Currents (I)	Max / Min. Values	Total Apparent Power (S)	

Measured Parameters (MPR-50)

+

Total Harmonic Distortion for Voltage (THD V %)	Total Harmonic Distortion for Current (THD I %)

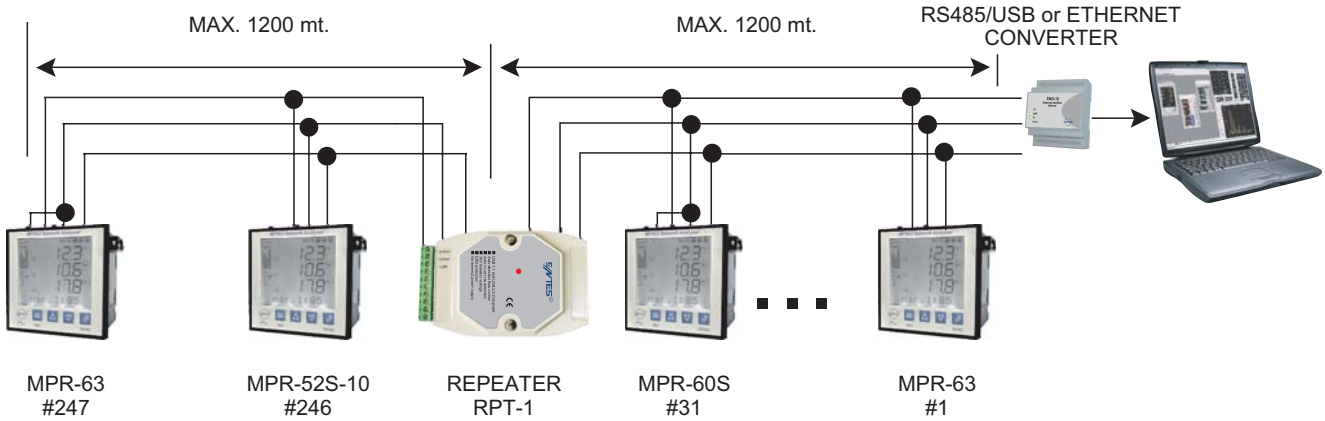
Measured Parameters (MPR-52S-10 / MPR-60S)

+

Individual Harmonics for Voltage - up to 31th	Individual Harmonics for Current - up to 31th

Measured Parameters (MPR-63)

247 DEVICES CAN BE CONNECTED SERIALLY BY USING REPEATERS.

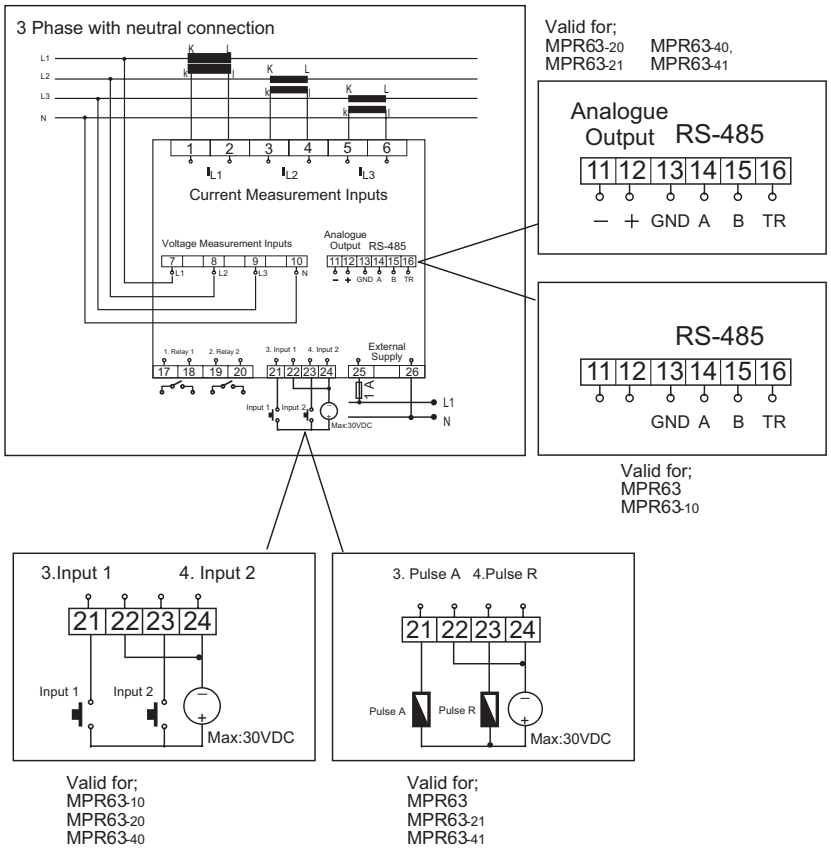


NETWORK ANALYSER
MPR-50 / MPR-52S / MPR-60S / MPR-63

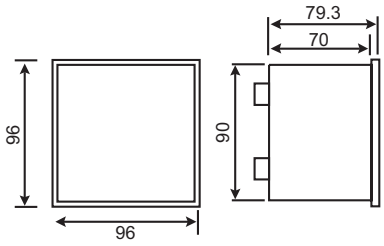
MODEL	MPR50	MPR52S-10	MPR60S	MPR-63
SPECIFICATIONS				
Electrical Parameters				
Harmonic Measurement	-	THD V%, THD I%		2 - 31th separately voltage & current THD V%, THD I%
Operating Voltage	85-265V AC / DC ; 50/60 Hz			
Network Type	3-phase / 4-wire (Star) ; 3-phase / 3-wire (Delta) ; 3-phase / 3-wire (Aron)			
Accuracy				
Voltage	0,5 % ± 2 digit			
Current	0,5 % ± 2 digit			
Frequency	0,1 % ± 2 digit			
Active Power	1 % ± 2 digit			
Reactive Power	2 % ± 2 digit			
Current Transformer Ratio	1...2 000 (programmable)			
Voltage Transformer Ratio	1,0…4 000 (programmable)			
Measurement input				
Voltage	1,0 - 300,0 V AC (P-N), 2,0 - 500,0 V AC (P-P)			
Current	5 mA - 5,5 A			
Measurement Ranges				
Voltage	1,0 - 400,0 kV			
Current	5 mA - 10 000 A			
Frequency	45,0 - 65,0 Hz			
Power	0 - 4 000 M (W, VAr, VA)			
Energy	0 - 99 999 999 kWh, kVArh			
Power Consumption	< 6 VA			
Burden	< 1 VA (Current burden), < 0,5 VA (Voltage burden)			
Demand Time	15 min. (Programmable via MPR-SW)			
Communication Interface	-	MODBUS RTU (RS-485)		
Baud Rate / Adress / Parity	-	1 200 - 38 400 bps / 1 - 247 / None, Odd, Even		
Alarm Contact Output	-	**Output 1 / Output 2 :** 2 NO relays , 5A, 1250 VA (resistive)		
Digital Input	-	for MPR-52S-10, MPR6x-10, MPR6x-20	**Output 3 / Output 4 :** 2 Digital Inputs	
Functions	-		Real Time / Latch	
Input Pulse Width	-		50 msec. (Min.)	
Operation Voltage	-		5...24VDC, 30VDC (Max.)	
Energy Pulse Output	-	MPR63, MPR-60S, MPR63-21 / 41, MPR-60S-21 / 41	**Output 3 :** Active Energy Pulse Output (1 kWh...50 MWh / pulse) **Output 4 :** Reactive Energy Pulse Output (1 kVArh...50 MVArh / pulse)	
Switch Period	-		Min. 1 sec. (100...2500 msec. pulse width)	
Operation Current	-		Max. 50 mA	
Operation Voltage	-		5...24V DC, max. 30V DC	
Analogue Output (optional)	(0)4-20mA (MPR6x-40, MPR6x-41) / (0)2-10V (MPR6x-20, MPR6x-21)			
Display		3,6" LCD with Backlight, 12 mm Height		
Data Logging	-	Selectable 28 parameters with Time Stamp (15 000 records)		
Memory	-	1 MB Internal Memory		
Mechanical Parameters				
Equipment Protection	Double Insulation (⧈) Measurement Category III			
Degree of Protection	IP40 (front panel), IP54 (Optional)			
Ambient Operating Temperature	-5°C, +55°C			
Connection / Installation	Terminal / Flush-mounting with rear terminals			
Dimensions	96x96 mm (PR19)			
Weight / each	0,9 kg			
Quantity in 1 package	8 pcs			

Connection Diagram

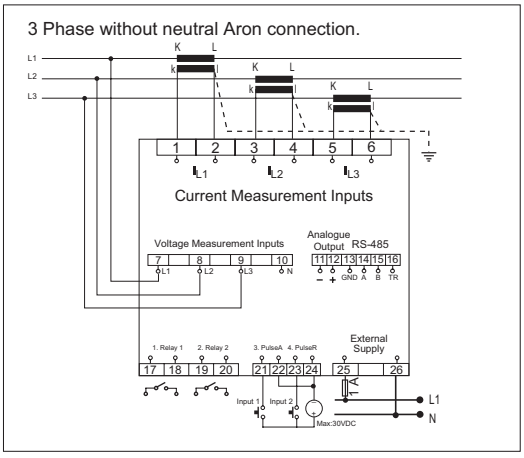
(PR19- 96x96mm)

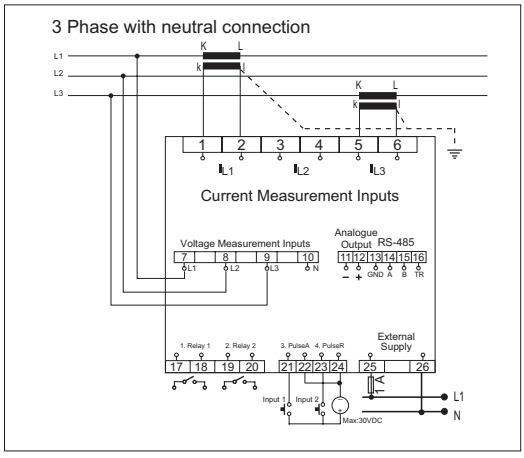


Dimensions



TYPE PR 19





Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

DIGITAL NETWORK ANALYSER
MPR-53 / EPM-07 Series

MPR-53CS-96

Modbus / Ethernet Gateway

General

MPR-53 / EPM-07 series measures many parameters of an electric network. More than 50 parameters are displayed.

- **EPM-07** : Network Analyser.
- **EPM-07S** : Network Analyser with RS-485 (MODBUS).
- **MPR-53** : Network Analyser with THD measurement.
- **MPR-53S** : Network Analyser with THD measurement and RS-485 (MODBUS).
- **MPR-53CS**: Network Analyser with THD measurement, RS-485, Pulse Counter, Digital Hour Counter, Alarm Contact
- IEC 61000-6-2, IEC 61000-6-4, IEC 61010-1

Modbus · Harmonics · Max. Demand · Pulse Output

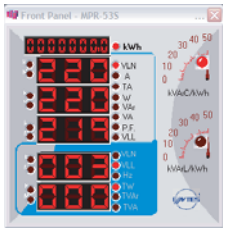
Digital Input · Alarm Contact · Digital Hour Counter · Pulse Counter

Product Code	% THD I	% THD V	Neutral Current	Digital Input	Energy Pulse Output	Dual Energy Meter	6 Different Energy Calculation Methods	.../5A	CT-25 (210A)	Alarm Contact	Digital Hour Counter	Pulse Counter	RS-485 Comm.
EPM-07 -96			●	●	●	●	●	●					
EPM-07 -DIN			●	●	●	●	●	●					
EPM-07S -96			●	●	●	●	●	●					●
EPM-07S -DIN			●	●	●	●	●	●					●
MPR-53 -96	●	●	●	●	●	●	●	●					
MPR-53 -DIN	●	●	●	●	●	●	●	●					
MPR-53S -96	●	●	●	●	●	●	●	●					●
MPR-53CS -96 **(new)**	●	●	●	●	●	●	●	●		●	●	●	●
MPR-53S -DIN	●	●	●	●	●	●	●	●					●
MPR-53CS -DIN **(new)**	●	●	●	●	●	●	●	●		●	●	●	
MPR-53S -DIN-CT25	●	●	●	●	●	●	●		○				
EPM-07S -DIN-CT-25			●	●	●	●	●		○				

○ Optional - Min. Order Quantity is 200pcs/devic

PC Interface Software (MPR-SW) :
MPR-SW is a graphic based software, which enables remote monitoring via intranet or internet.

Please refer to page 20 for MPR-SW Software.



popular in small cabinets!

MPR-53S-DIN-CT25

CT-25 is a Current Transformer, which is used together with MPR-53S-DIN-CT25 model.

It is a unique solution, which replaces conventional type CTs up to 120A.

Phase - Neutral Voltages (V_{LN})	Total Current (I)	Apparent Power (S)	Reactive Energy - Capacitive (kVArh)
Phase - Phase Voltages (V_{LL})	Power Factor (P.F)	Total Active Power (P)	Reactive Energy - Inductive (kVArh)
Average Phase - Neutral Voltage	Cos	Total Reactive Power (Q)	Max. Demand
Average Phase - Phase Voltage	Frequency (Hz)	Total Apparent Power (S)	Max / Min. Values
Phase Currents (I)	Active Power (P)	Active Energy - Import (kWh)	
Neutral Current	Reactive Power (Q)	Active Energy - Export (kWh)	

Measured Parameters (EPM-07 / 07S)

+

Total Harmonic Distortion for Voltage (THD V %)	Total Harmonic Distortion for Current (THD I %)

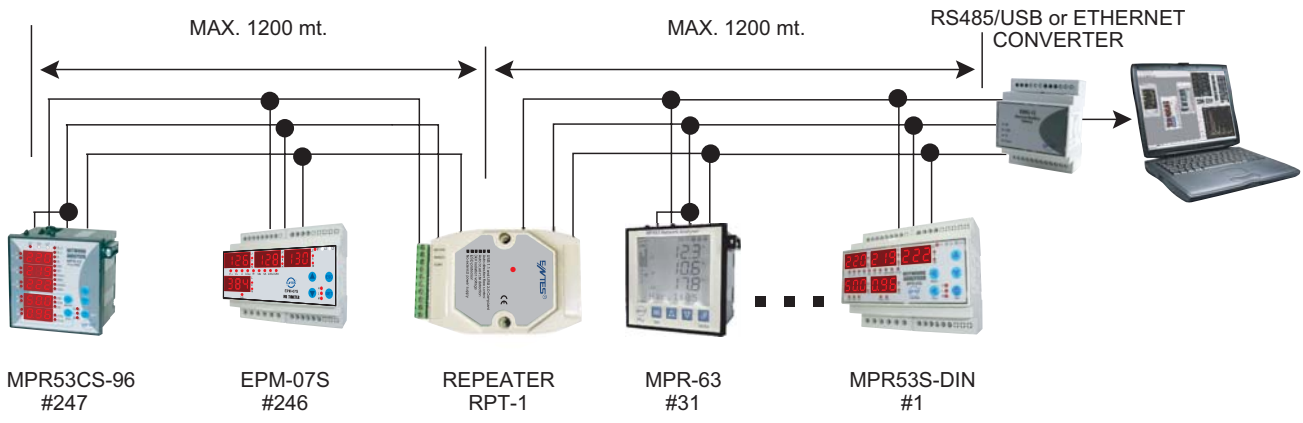
Measured Parameters (MPR-53 / MPR-53S)

+

Digital Hourmeters	Digital Pulse (Count)

Measured Parameters (MPR-53CS)

247 DEVICES CAN BE CONNECTED SERIALLY BY USING REPEATERS



DIGITAL NETWORK ANALYSER
MPR-53 / EPM-07 Series

(new)

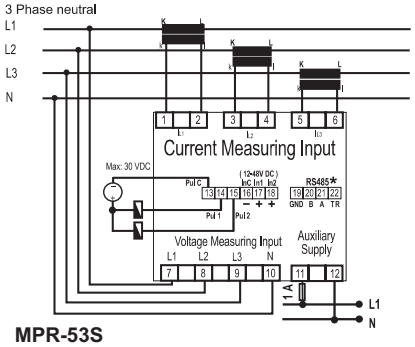
MODEL	EPM-07	EPM-07S	MPR-53	MPR-53S	MPR-53C
SPECIFICATIONS					
Electrical Parameters					
Operating Voltage	110VAC* / 230 V AC ±10%; 45 - 65 Hz				
Network Type	3-phase / 4-wire (Star), 3-phase / 3-wire (Delta), 3-phase / 3-wire (Aron)				
Accuracy	1% ±1 digit				
Current Transformer Ratio	1…2000 (programmable)				
Voltage Transformer Ratio	0,1…4000,0 (programmable)				
Measurement input					
Voltage	10 - 300 V AC (L-N), 10 - 500 V AC (L-L)				
Current	50 mA - 5,5 A				
Measurement Ranges					
THD	-			0-99.9 %	
Voltage	10 - 500 V (direct), 10 - 400 kV (with voltage transformer)				
Current	50 mA - 5,5 A (direct), 50 mA - 10.000 A(with current transformer)				
Frequency	20 - 90 Hz				
Power Factor	4 quadrant				
Power	0 - 215 M (W, VAr, VA)				
Energy	0 - 99 999 999 999,9 kWh, kVArh				
Power Consumption	< 4 VA				
Burden	< 1 VA (Current burden), < 0,5 VA (Voltage burden)				
Demand Time	1 - 60 min. (programmable)				
Communication Interface	MODBUS RTU (RS-485) [for EPM-07S & MPR-53S]				
Baud Rate	1200 - 38400 bps				
Address	1 - 247				
Parity	No, odd, even				
Alarm Contact Output	Output 1/2 : 2 NO relays, 5A, 1250 VA (resistive) [for MPR-53CS]				
Digital Output	Output 3/4 : Mentioned on Front Panel [for MPR-53CS] Output 5/6/7/8 : (Virtual Outputs) Mentioned in Register Table				
Digital Hourmeter	3 Hourmeters (HH HH HH HH.HH) : *Total Hours (non-resettable)* *Run Hours (resettable)* *Setpoint Hours (resettable for 16 setpoints)* [for MPR-53CS]				
Digital Input	2 Digital Inputs				
Input Pulse Width	80 msec. (Min.), (100msec. period)				
Operation Voltage	12...48 V AC / DC				
Energy Pulse Output	NPN Transistor				
Switch Period	Min. 1,6 sec. (400 msec. pulse width)				
Operation Current	Max. 50 mA				
Operation Voltage	5…24 V DC, max. 30 V DC				
Display	Red LED ; 10 mm Height				
Mechanical Parameters					
Equipment Protection	Double Insulation (⧈), Measurement Category III				
Ambient Operating Temperature	-5°C, +55°C				
Degree of Protection	IP40 (front panel)				
Connection / Installation	Terminal / Flush-mounting with rear terminals				
Dimensions	96x96 mm (PR19**), DIN6 (PK26**)				
Weight / each	0,6 kg (PR19) ; 0,6 kg (DIN6)				
Quantity in 1 package	12 pcs (PR19), 12 pcs (DIN6)				

* 110 V AC, 60Hz Supplied devices are custom manufactured by order

Connection Diagram

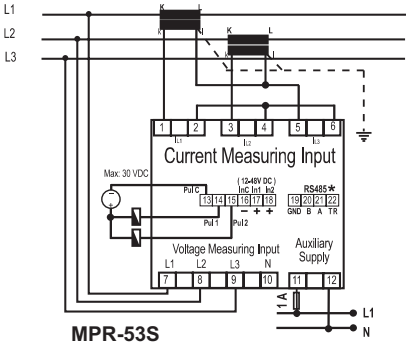
(PR 19- 96x96mm)

3 Phase neutral



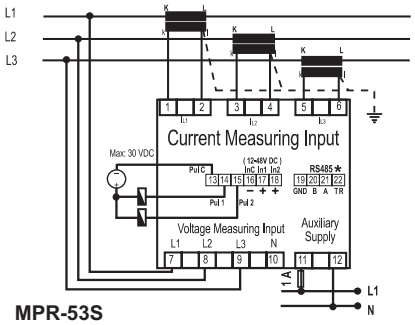
MPR-53S

3 Phase without neutral current input with Aron wiring configuration

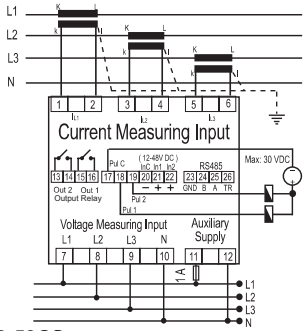


MPR-53S

3 Phase without neutral

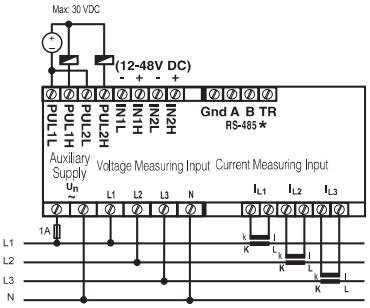


MPR-53S



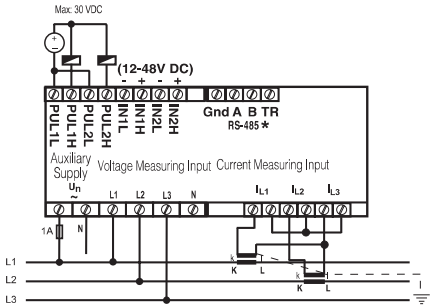
MPR-53CS

(PK 26 - DIN6)



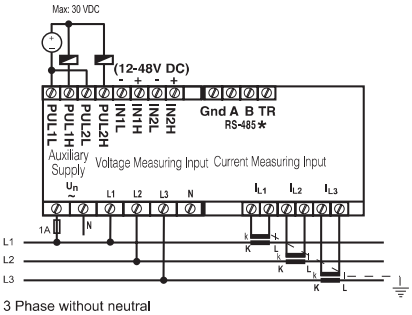
3 Phase neutral

MPR-53S



3 Phase without neutral current input with Aron wiring configuration

MPR-53S

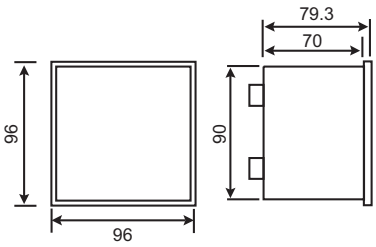


3 Phase without neutral

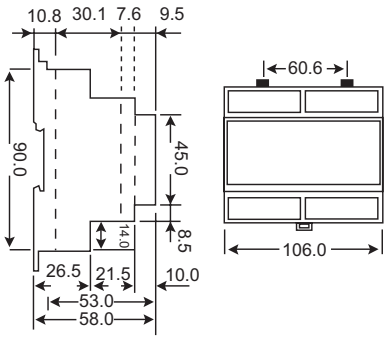
MPR-53S

* RS-485 terminals are standart for Epm-07 and MPR-53S

Dimensions



TYPE PR 19



TYPE DIN / PK 26

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

POWER FACTOR CONTROLLERS
RG Series

Modbus / Ethernet Gateway

CE

Modbus | Harmonics | no >>> °C

Product Code	Smart Switching	Single Phase / 1 CT	3-phase / 3 CTs	Max. Steps	Single-phase Capacitor Use	3-phase Capacitor Use	THD Protection	Overheat Protection	Dual Target cos-phi	Auto Setup	Password Protection	RS-485 Communication	Over Heat Protection	Pcs / Carton
RG-6T		●		6		●								4
RG-8T		●		8		●								4
RG-12T		●		12		●								4
RG-8B -96 (new)	●	●		8		●	●	●	●	●	●		○	12
RG-8BS -96 (new)	●	●		8		●	●	●	●	●	●	●	○	12
RG3-12C	●		●	12	●	●	●	●	●	●	●		○	4
RG3-12CS	●		●	12	●	●	●	●	●	●	●	●	○	4

Discharge Unit

DU-3 Discharge Unit — Required for L.V. Power Capacitors up to 50 kVAr, 400V AC – 415V AC — 20

- IEC 61000-6-2, IEC 61000-6-4, IEC 61010-1

Major features of RG-B (single phase) and RG3-C (3-phase) series :

Overheat protection no >>> °C

(for RG-B / BS and RG3-C / CS series)

capacitor steps..... 1 — 2-3-4 — 5-6-7-8-9 — 10-11-12

phase..... L1-L2-L3 — L1 — L2 — L3

capacitor steps.....1-2-3 — 4-5-6-7 — 8 — 9-10-11-12

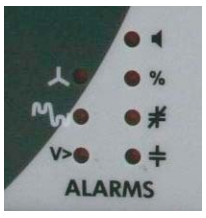
phase..... L1-L2-L3 — L1 — L2 — L3

etc...

programmable steps

(for RG3-C / CS series)

alarms

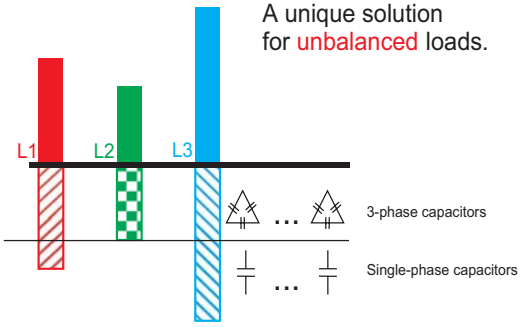


- Harmonic
- Temperature
- Improper Capacitor
- Wrong Connection
- Insufficient compensation
- Over Voltage
- Over compensation

(for RG-B / BS and RG3-C / CS series)

Compensation of each phase individually

A unique solution for unbalanced loads.



(for RG3-C / CS series)

Phase - Neutral Voltages (V_{LN})	Phase Current (I)	Active Power (P)	Apparent Power (S)
Phase - Phase Voltages (V_{LL})	Cos	Reactive Power (Q)	

Measured Parameters (RG-T series)

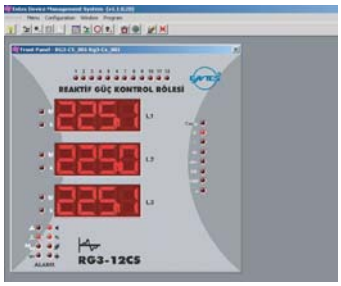
Individual Harmonics for Voltage - up to 19th	Total Harmonic Distortion for Voltage (THD V %)
Individual Harmonics for Current - up to 19th	Total Harmonic Distortion for Current (THD I %)

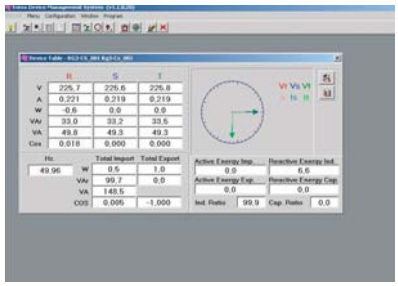
Measured Parameters (RG-B / RG-BS series)

3-Phase Currents (I)	Total Current (I)	Total Active Power (P)	Total Apparent Power (S)	Total Reactive Power (Q)
Active Energy - Import (kWh)	Active Energy - Export (kWh)	Reactive - Capacitive (kVArh L)	Reactive - Inductive (kVArh C)	

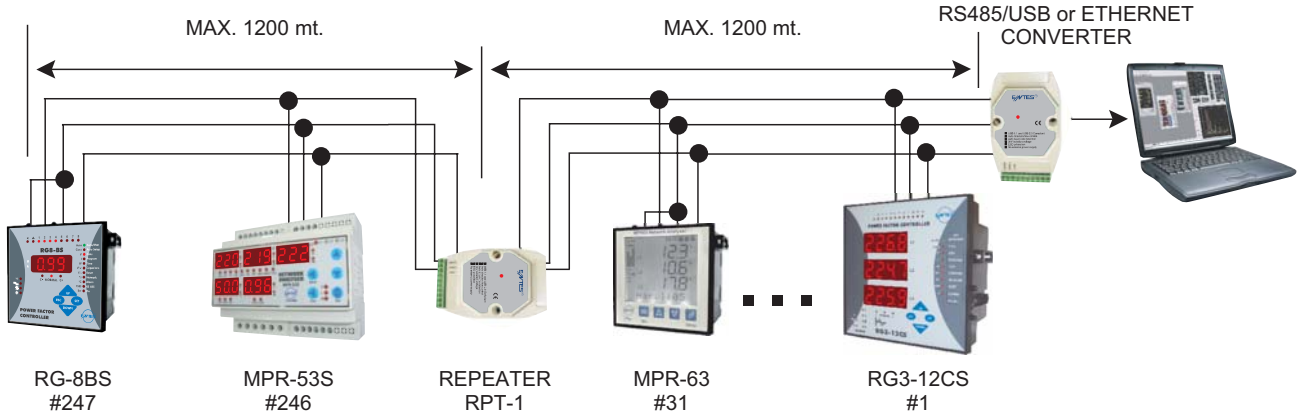
Measured Parameters (RG3-C / RG-CS series)

Remote Monitoring & Controlling of Power Factor Controllers is done with MPR-SW software :





247 DEVICES CAN BE CONNECTED SERIALLY BY USING REPEATERS



POWER FACTOR CONTROLLERS

RG Series

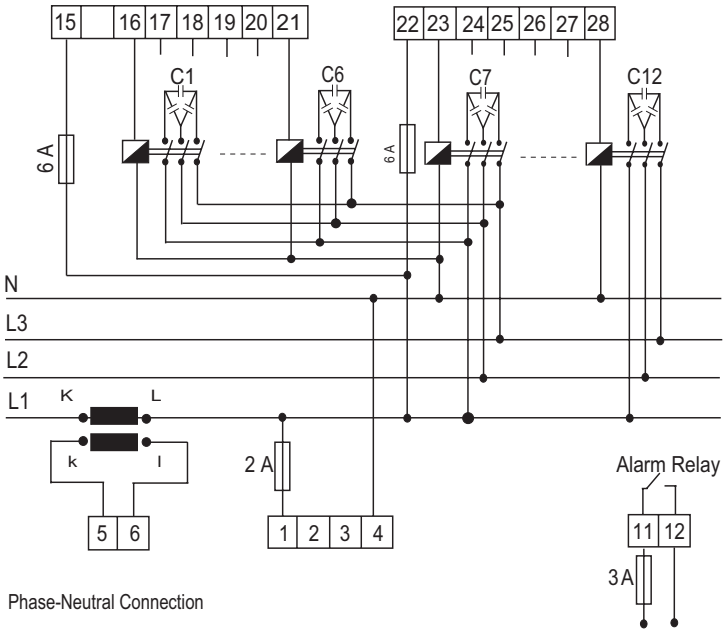
MODELS	RG-T	RG-B (new)	RG-BS (new)	RG3-C	RG3-CS
SPECIFICATIONS					
Electrical Parameters					
Operating Voltage (U_n)	110 V AC* / 230 V AC ±10%; 50 / 60 Hz				
Operating Current	100 mA - 5,5 A				
Capacitor Steps	6, 8, 12	8		12	
Network Type		Single-phase 1 CT		3-phase 3 CTs (3 phase / 4 wires)	
Accuracy	1% ±1 digit (V, I, cos) ; 2% ±1 digit (W, VAr, VA)				
Current Transformer Ratio	5…10000 / 5A				
Power Consumption	< 2 VA (Current Circuit) < 3 VA - 10 VA (Voltage Circuit)				
Cos Setting	0,8 < Cos <1 (inductive)	0,8 < Cos <1 (inductive / capacitive)			
Dual Target Cos (for mains and generator)		-		●	
C/k Setting	0,02 - 1,00				
Automatic Energy Correction	-	●			
Automatic Disconnection of Damaged Capacitor Steps	-	●			
Time Delay Between Steps	2-1.800 sec. (for switch on / off separately)	1-1.800 sec. (for switch on / off separately)			
Discharge Time (Reconnection Time)	2-1.800 sec.	1-1.800 sec.			
Over Voltage Setting		240 - 275 V AC			
Output Contact		3 A, 750 VA			
Display	Red LED, 14 mm Height (144x144 mm) / 10 mm Height (96x96 mm)				
Harmonic Measurement	-	Up to 19th harmonic for current and voltage seperately			
Programmable THD-I and THD-V Alarm	-	●			
Programmable Discharge Time	-	●			
Programmable Over Voltage Alarm	-	●			
Automatic Power Calculation	-	●			
Programmable Energy Ratio Alarm (Inductive/Active) / (Capative/Active)	-	●			
Energy Measurement	-	-		●	
Compensation of Each Phase	-	-		●	
Displaying Parameters for Each Phase	-	-		●	
Password Protection for Setup	-	●		●	
RS-485 Communication	-	-	●	-	●
Alarm Contact Output (Over Voltage, Harmonic)	-	●			
Over Heat Protection	-	○			
Fan Contact Output	-	○			
Mechanical Parameters					
Equipment Protection	Double Insulation (⧈), Measurement Category III				
Ambient Operating Temperature	-5°C, +55°C				
Ambient Humidity	95%				
Degree of Protection	IP40 (front panel)				
Connection / Installation	Terminal / Flush-mounting with rear terminals				
Dimensions	144x144mm (PR16); 96x96mm (PR19)-only for 8 steps RG-8B/BS				
Packing Weight	0,9 kg (PR16) ; 0,6 kg (PR19) - only for 8 steps RG-8B/BS				
Quantity in 1 package	4 pcs (PR16) ; 12 pcs (PR19) - only for 8 steps RG-8B/BS				

* 110 V AC, 60Hz Supplied devices are custom manufactured by order

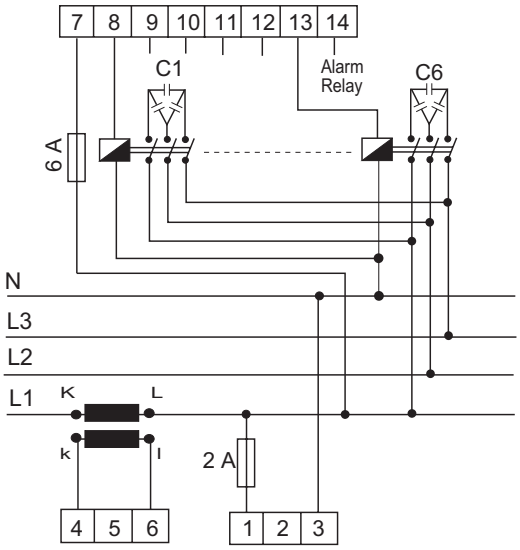
● Stan

PROSWEDE-elab
Industrigatan 4, 212 14 Malmö Tel 040-38 15 70 Fax 040-38 15 78. Webbutik: www.proswede-elab.se

Connection Diagram

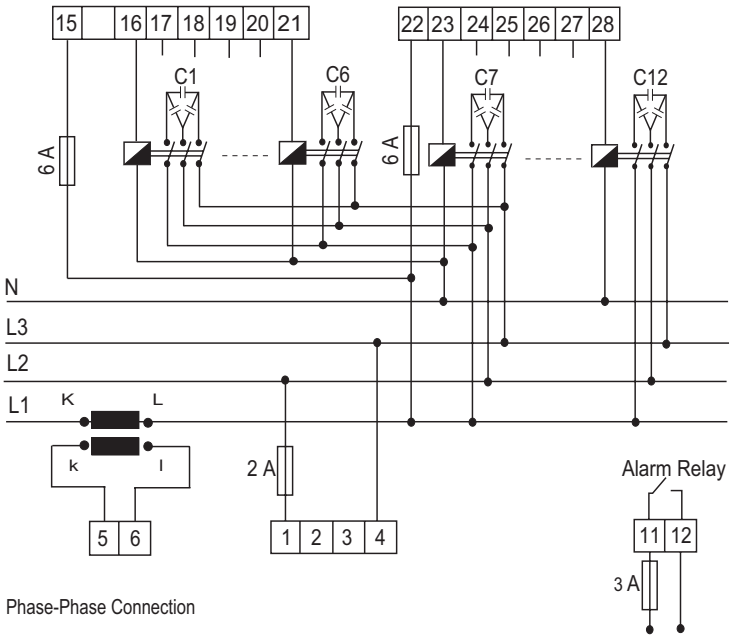


Phase-Neutral Connection

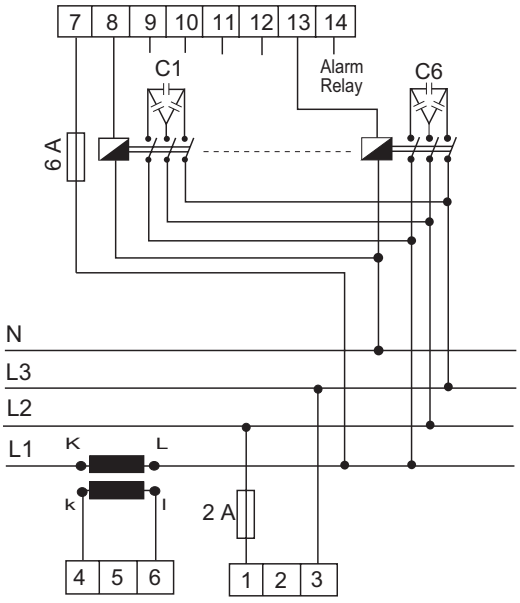


Phase-Neutral Connection**

RG-T



Phase-Phase Connection



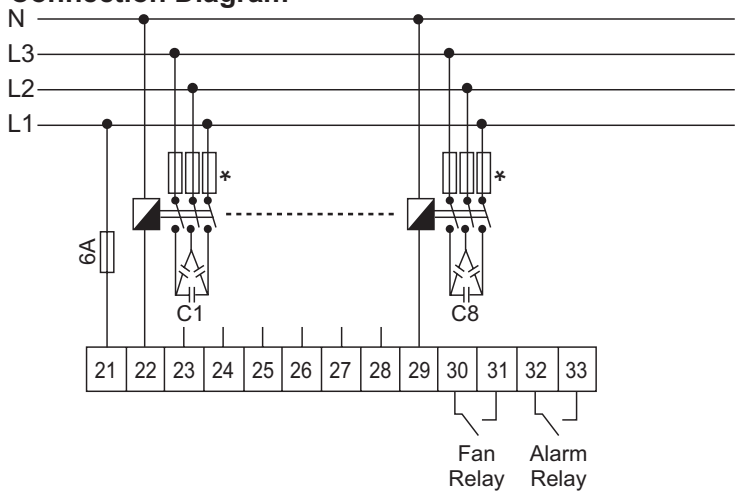
Phase-Phase Connection**

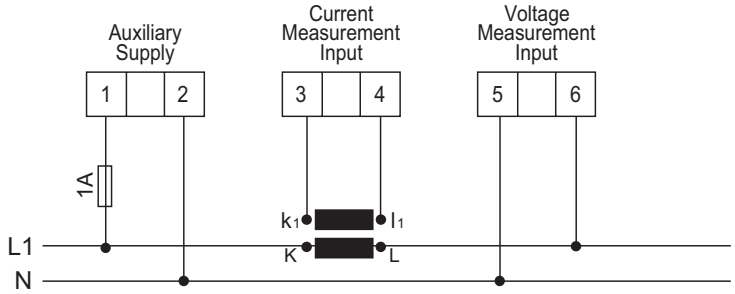
RG-T

Connection diagrams are given for reference.Please always check the latest user manual given with product or download from www.entes.com.tr.

POWER FACTOR CONTROLLERS
RG Series

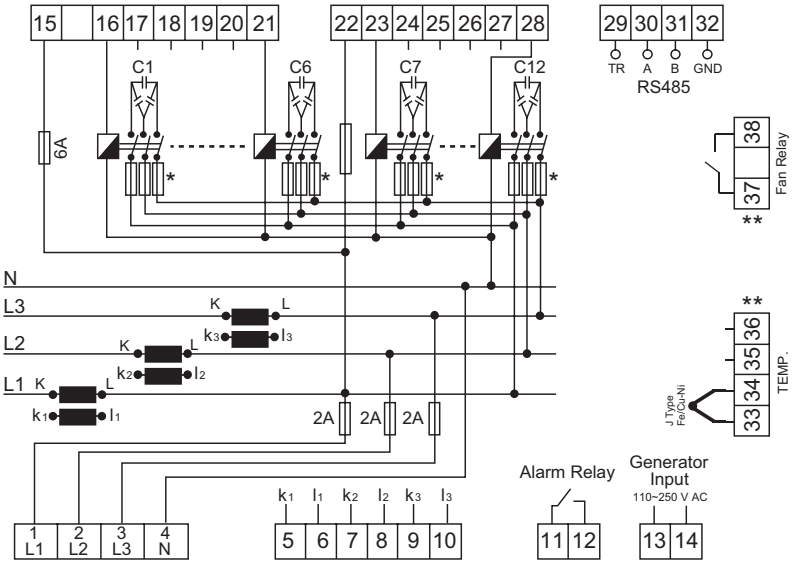
Connection Diagram





* Current value of 3-Fuses, which are connected to protect the capacitors, is chosen according to the nominal current value of capacitors.

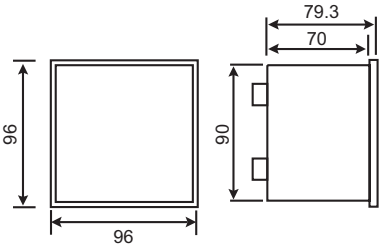
RG8-BS



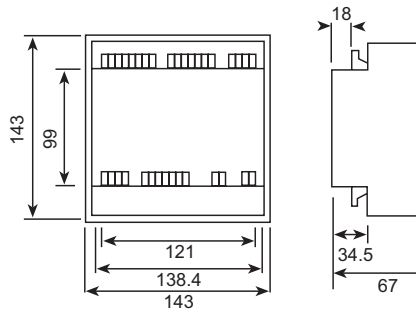
RG3-12CS

** Optional

Dimensions



TYPE PR 19



TYPE PR 16

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

new

EPM-34

- .../5A and .../1A
- 24-240V AC/DC
- Class 0,5
- IP54

new

EVM-35

- 24-240V AC/DC
- Class 0,5
- IP54

Product Code	3 ~ Voltage	3 ~ Current	Cos	Hz (Frequency)	I neutral	Demand	Dual Demand*	Max. Values	Min. Values	Alarm Contact	Under / Over Voltage Protection	Under / Over Current Protection	Under / Over Frequency Protection	RS-485 Comm.	.../5A	.../1A	CT-25 (120A)	4 Digits Display	5 Digits Display	24-250V AC/DC	Flush Mount	Rail Mount	Pcs / Carton
EPM-04 -96	●	●		●	●	●		●	●						●		●				●		12
EPM-04 -DIN	●	●		●	●	●		●	●						●		●					●	12
EPM-04C -96 (new)	●	●		●	●	●		●	●	●	●	●	●		●		●				●		12
EPM-04C -DIN (new)	●	●		●	●	●		●	●	●	●	●	●		●		●					●	12
EPM-04CS -96 (new)	●	●		●	●	●		●	●	●	●	●	●	●	●		●				●		12
EPM-04CS -DIN (new)	●	●		●	●	●		●	●	●	●	●	●	●	●		●					●	12
EPM-06 -96	●	●	●	●		●									●		●				●		12
EPM-06 -DIN	●	●	●	●		●									●		●					●	12
EPM-06C -96 (new)	●	●	●	●		●		●	●	●	●	●	●		●		●				●		12
EPM-06C -DIN (new)	●	●	●	●		●		●	●	●	●	●	●		●		●					●	12
EPM-06CS -96 (new)	●	●	●	●		●		●	●	●	●	●	●	●	●		●				●		12
EPM-06CS -DIN (new)	●	●	●	●		●		●	●	●	●	●	●	●	●		●					●	12
EPM-34 -96 (new)		●					●								●	●		●		●	●		12
EVM-35 -96 (new)	●																		●	●	●		12

*Dual Demand: 1st Demand is in terms of minutes;
2nd Demand is in terms of seconds

● Optional - Min. Order Quantity is 200pcs/device.

EPM-06C-DIN

MD

Max. Demand

Modbus

Alarm Contact

EPM-06CS-96

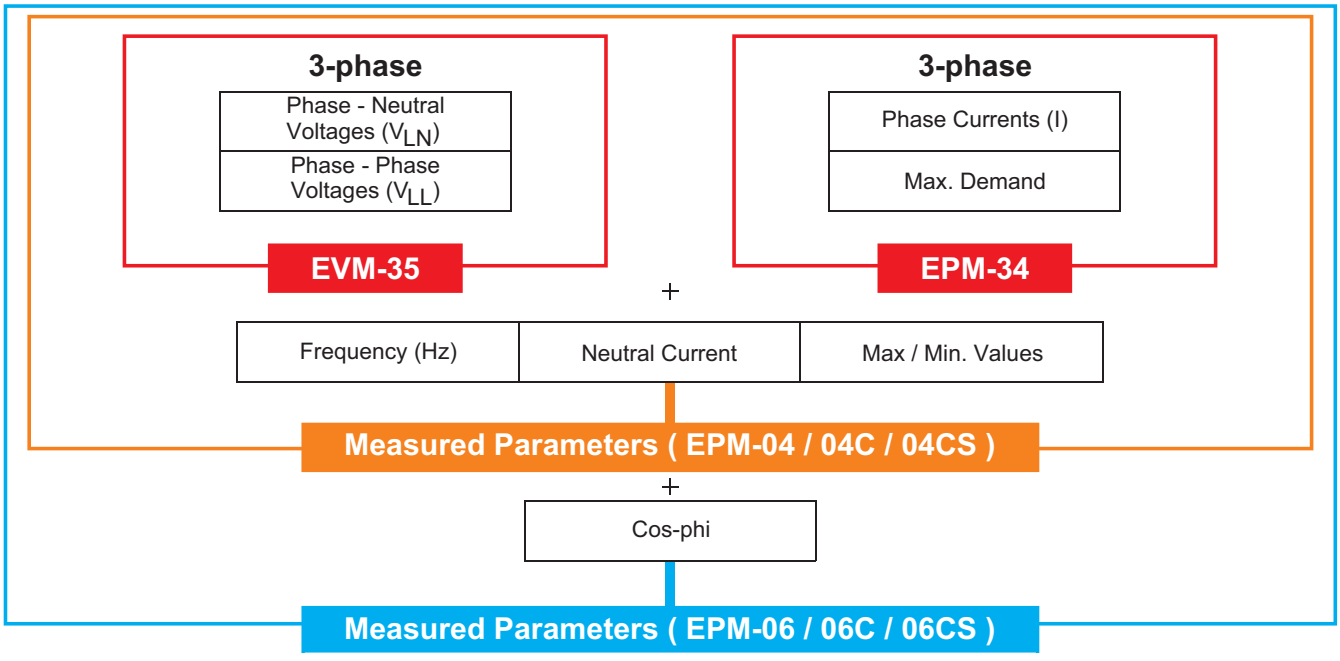
KEMA KEUR CE

DIGITAL MULTIMETERS

EPM-04 / EPM-06 / EVM-3x Series

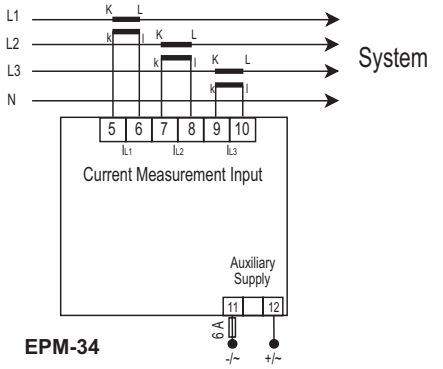
MODELS	EPM-04	(new) EPM-04C	(new) EPM-04CS	EPM-06	(new) EPM-06C	(new) EPM-06CS	(new) EPM-34	(new) EVM-35
SPECIFICATIONS								
Functions								
Programmable Hysterisis		●	●	●	●	●		
Instant Tripping Feature		●	●	●	●	●		
Programmable CT Primary Value	●	●	●	●	●	●	●	
Programmable Voltage Tr. Ratio	●	●	●	●	●	●		●
Programmable Demand Time	●	●	●	●	●	●	●	
Demurrage Delay		●	●	●	●	●		
Fault & Fault Recovery Delay		●	●	●	●	●		
Latch Function		●	●	●	●	●		
Password Protection for Setup	●	●	●	●	●	●	●	●
Phase Sequence Protection		●	●		●	●		
RS-485 Communication			●			●		
Electrical Parameters								
Operating Voltage(Un)	110 V AC,* / 230 V AC ±10% , 50/60 Hz						24-250V AC/DC	
Network Type	3-phase / 4-wire (Star)							
Accuracy	1% ± 1 digit						0,5% ± 1 digit	
Voltage Transformer Ratio	1...2000						-	0,1...400,0
Current Transformer Ratio	1...2000						1...1000	
Measurement Ranges							-	-
Current	50 mA - 5,5 A						5mA...5000A(.../5A) 5mA...1000A(.../1A)	
Voltage	10 - 300 V AC (L-N) ; 10 - 500 V AC (L-L)						-	1V-40 kV
Frequency	45 - 65 Hz						-	
Demand Time	1 - 60 min. (Programmable)						-	
Dual Demand Time	-						1-60 min. 1-60 sec.	-
Output Contact	-	5 A, 1250 VA		-	5 A, 1250 VA		-	
Display	-	Red LED, 10 mm Height					Red LED, 12 mm	
Mechanical Parameters								
Equipment Protection	Double Insulation(⧈), Measurement Category III							
Ambient Operating Temperature	-5°C, +50°C							
Degree of Protection	IP40 (front panel)						IP54 (front panel)	
Dimensions	96x96 mm (PR19), DIN6 / PK26						96x96 mm (PR19)	
Weight / each	0,4 kg (PR19), 0,6 kg (PR16), 0,4 kg (DIN6)						0,4 kg (PR19)	
Quantity in 1 package	12 pcs (PR19), 12 pcs (DIN6 / PK26)						12 pcs (PR19)	

* 110 V AC, 60Hz Supplied devices are custom manufactured by order

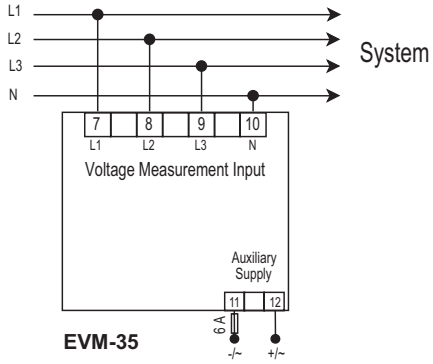


Connection Diagram

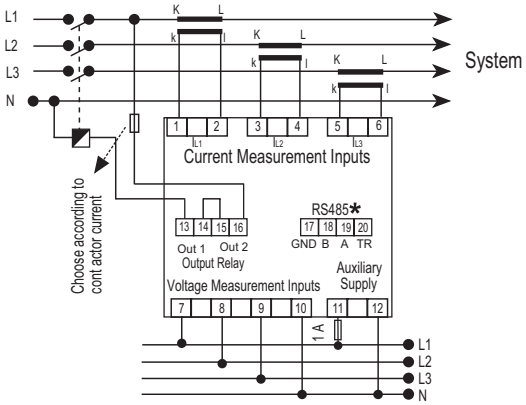
(PR19- 96x96mm)



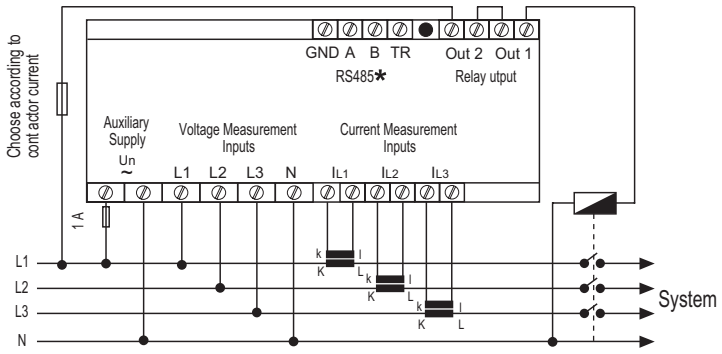
EPM-34



EVM-35

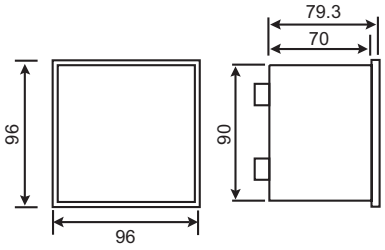


EPM-04S / EPM-06S

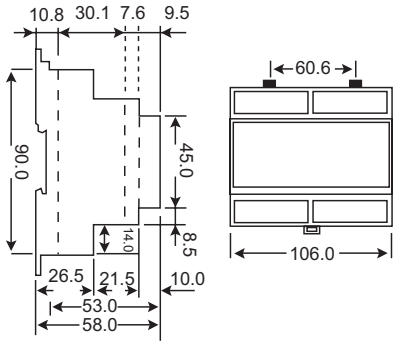


EPM-04S DIN / EPM-06S DIN

Dimensions



TYPE PR 19

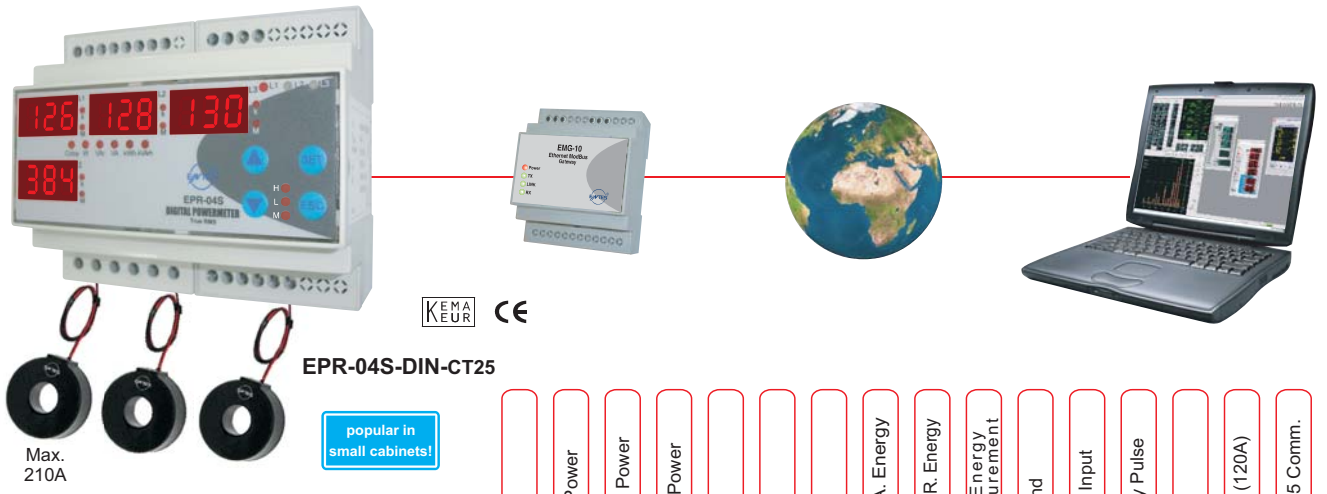


TYPE DIN / PK 26

Connection diagrams are given for reference.Please always check the latest user manual given with product or download from www.entes.com.tr.

DIGITAL POWER & ENERGYMETERS

EPR Series



EPR-04S-DIN-CT25

Max. 210A

popular in small cabinets!

Product Code	Cos	W A. Power	VAr R. Power	VA G. Power	W	VAr	V.A	kWh A. Energy	kVArh R. Energy	Dual Energy Measurement	Demand	Digital Input	Energy Pulse	.../5A	CT-25 (120A)	RS-485 Comm.	Pcs / Carton
EPR-03 -96					●	●	●				●			●			12
EPR-04 -96	●	●	●	●	●	●	●	●	●	●	●	●	●	●			12
EPR-04 -DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	●			12
EPR-04S -96	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	12
EPR-04S -DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	12
EPR-04S -DIN-CT25	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		12
ES-25N	Mechanical Energy Counter (25 A)							●					●				10
ES-32L (new)	Digital Energy Counter (32 A)							●									10

● Optional - Min. Order Quantity is 200pcs/device.

CT-25 is a Current Transformer, which is used together with EPR-04S-DIN-CT25 model. It is a unique solution, which replaces conventional type CTs up to 120A.

MODELS	EPR-04	EPR-04S
SPECIFICATIONS		
Electrical Parameters		
Operating Voltage(Un)	110V AC*, / 230 V AC ±10% , 50/60 Hz	
Network Type	3-phase / 4-wire (Star); 3-phase / 3-wire (Delta)- optional	
Accuracy	1% ±1 digit (W,VA), 2%, ±1 digit (VAr)	
Current Transformer Ratio	5...10.000 / 5A	
Voltage Transformer Ratio	1...2.000	
Measurement Input		
Voltage	10 - 300 V AC (L-N) ; 10 - 500 V AC (L-L)	
Current	50 mA - 5,5 A	
Measurement Ranges		
Power	0 - 900 M (W, VAr, VA)	
Energy	9 999 999,99 MWh, MVArh	
Power Consumption	< 4 VA	-
Burden	< 1 VA (Current burden), < 0,5 VA (Voltage burden)	
Energy Pulse Output	-	NPN Transistor
Switch Period	Min. 1,6 sec. (400 msec. pulse width)	
Operating Current	Max. 50 mA	
Operating Voltage	5...24 V DC, Max. 30 V DC	
Digital Input	-	2 Digital Inputs
Input Pulse Width	50 msec. (Min.)	
Operation Voltage	5...24 V DC, Max. 30 V DC	
Display	Red LED, 10 mm Height	
Mechanical Parameters		
Ambient Operating Temperature	-5°C, +50°C	
Dimension	96x96mm (PR19), DIN 6 (PK26)	
Weight / each	0,5 kg	
Quantity in 1 package	12 pcs	

* 110 V AC, 60Hz Supplied devices are custom manufactured by order

EPR-04S-96

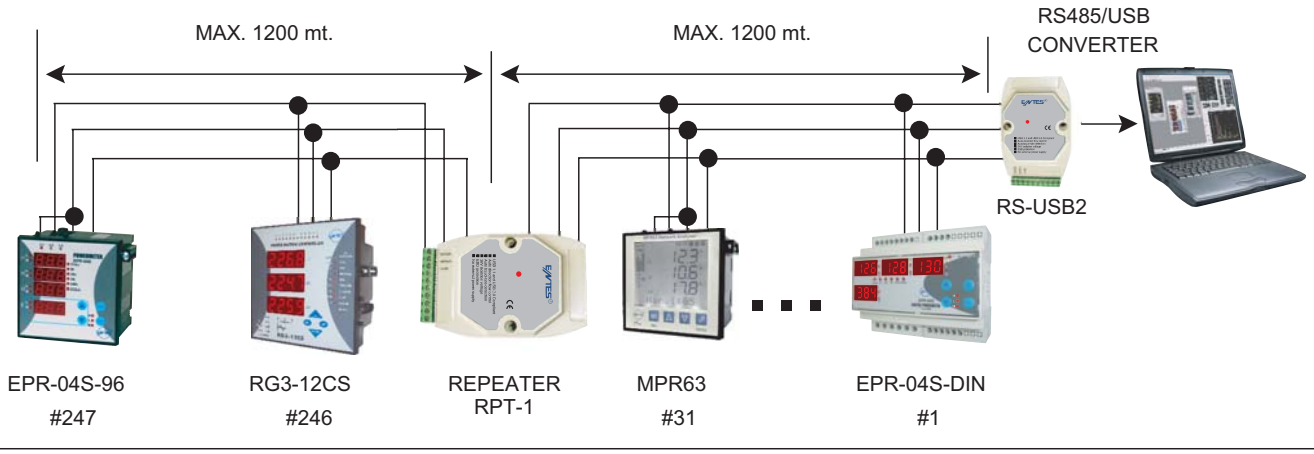
General

- **EPR-04: Digital Power and Energymeter**
  EPR-04 measures active / reactive / apparent power and active / reactive energy for each phase and cos in 4 displays.
- **EPR-04S: Digital Powermeter with RS-485**
  In addition to EPR-04 features, EPR-04S has RS-485 communication. Power, energy and cos values can be monitored via MPR-SW software.
- **Software**
  MPR-SW : Software for monitoring and recording parameters for MPR and EPR Series.

Features

- Non-flammable enclosure
- Double Insulation (⧈)
- Measurement Category III
- Terminal Connection
- Flush mounting with rear terminals
- IP40 (front panel), IP00 (terminals)
- IEC 61010-1, IEC 61000-6-2, IEC 61000-6-4

247 DEVICES CAN BE CONNECTED SERIALLY BY USING A REPEATER



ES-25N

General
ES-25N / ES-32L : Watt-Hour Meter

In today's world, Efficient Power Management is very important for low-cost. Measuring process must have been fulfilled with certain accuracy for precise analysing and measuring the energy.

ES-25N / ES-32L measure the active watt hour (kWh) consumption directly and error free in single phase systems and it shows the total watt hour consumption.
The most important features of the device are its reliability, small size, light weight, modern design, and easy installation.

ES-32L

Technical Features	ES-25N Mechanical Energy Counter	ES-32L Digital Energy Counter
Accuracy	Class 1	
Operating Voltage	230 VAC, 50 / 60 Hz.	
Tolerance	-20 % / +15 %	
Operating Current	0,02~25 A	0,02~32 A
Nominal Current	In = 5 A, IMax. = 25 A	In = 5 A, IMax. = 32 A
Min. Rated Current	20 mA	
Frequency Range	50-60 Hz ±%10	
Display	6+1 digit = 999999,9 kWh	
Pulse Output	2000 Imp./kWh	1000 Imp./kWh
Pulse Time	Ti=80 ms.	
Installation	Rail Mount (DIN EN50022)	
Power Consumption	< 2 VA	
Operating Temperature	(-20 °C) - (+65 °C)	
Weight	75 gr. (except package weight)	
EMC		
Surge Voltage Test	4 kV 1.2 / 50 µs. (IEC 1000-4-5)	
Burst Test	4 kV (IEC 1000-4-4)	

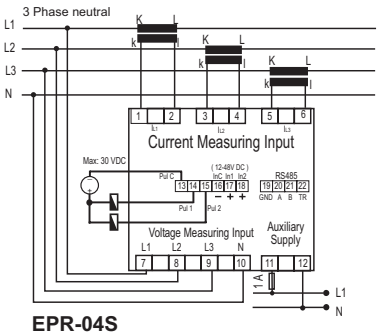
DIGITAL POWER & ENERGYMETERS

EPR Series / ES-25N

Connection Diagram

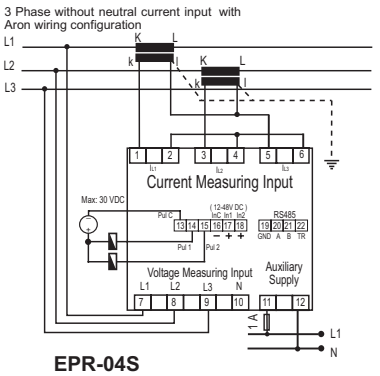
(PR19- 96x96mm)

3 Phase neutral



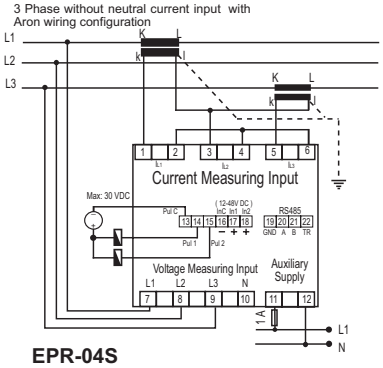
EPR-04S

3 Phase without neutral current input with Aron wiring configuration



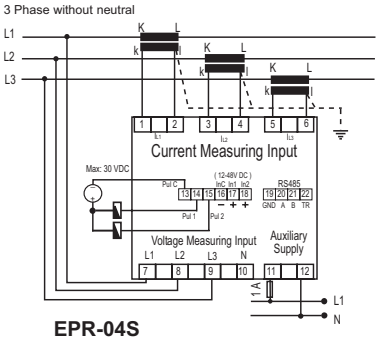
EPR-04S

3 Phase without neutral current input with Aron wiring configuration



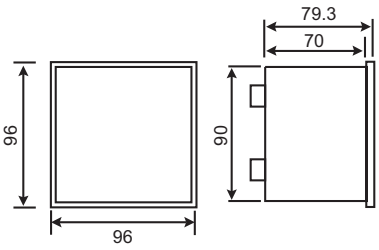
EPR-04S

3 Phase without neutral

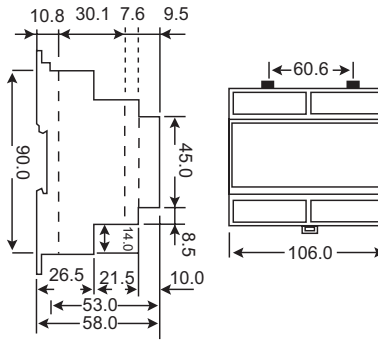


EPR-04S

Dimensions



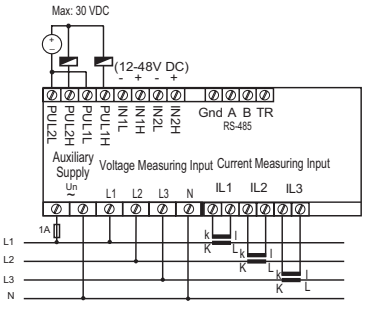
TYPE PR 19



TYPE DIN / PK 26

(PK26 - DIN6)

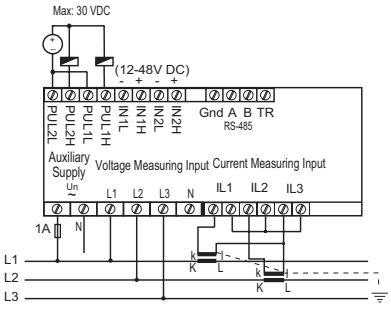
Max: 30 VDC



3 Phase neutral

EPR-04S

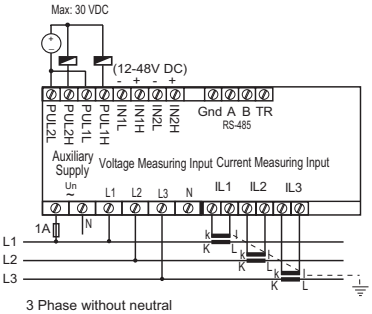
Max: 30 VDC



3 Phase without neutral current input with Aron wiring configuration

EPR-04S

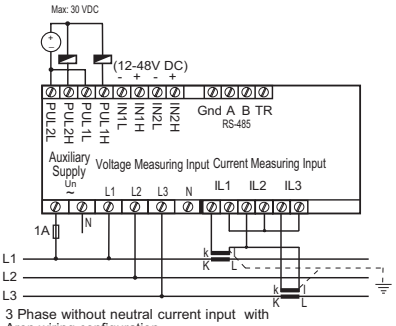
Max: 30 VDC



3 Phase without neutral

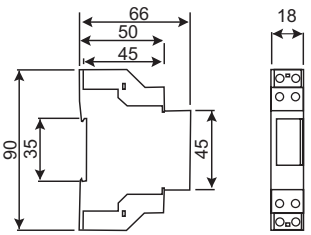
EPR-04S

Max: 30 VDC



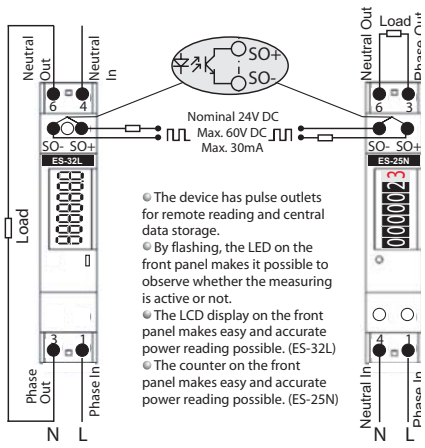
3 Phase without neutral current input with Aron wiring configuration

EPR-04S



Note: Should not be used for billing purpo

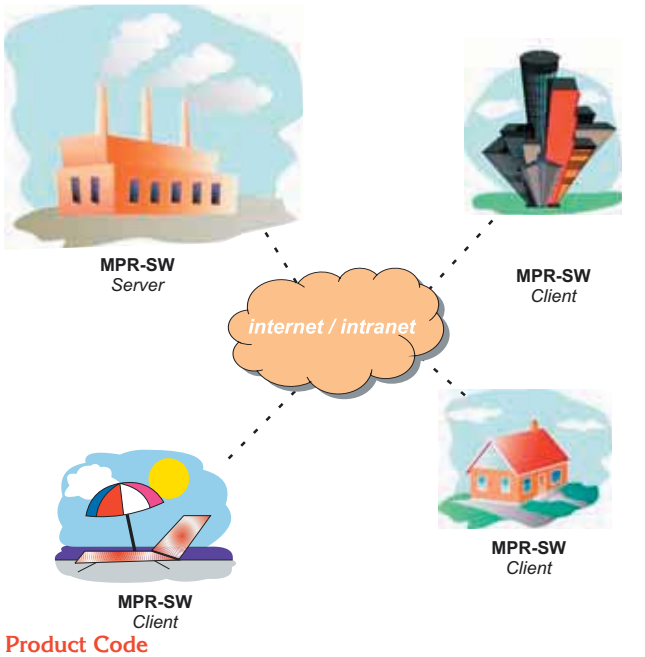
Connection Diagram



- The device has pulse outlets for remote reading and central data storage.
- By flashing, the LED on the front panel makes it possible to observe whether the measuring is active or not.
- The LCD display on the front panel makes easy and accurate power reading possible. (ES-32L)
- The counter on the front panel makes easy and accurate power reading possible. (ES-25N)

Connection diagrams are given for reference.Please always check the latestuser manual given with product or download from www.entes.com.tr.

SOFTWARE for MONITORING and RECORDING PARAMETERS
MPR-SW SERIES



General

MPR-SW Software is designed for monitoring and recording the electrical network parameters on PC, via Internet / Intranet (Modbus RTU, Modbus TCP).

Features

- Communication with max. 247 devices (MPR-63, MPR60S, MPR-53S, RG-CS, EPR-04S, EPM-0x series)
- Front panel simulations of devices on PC. (Figure 1)
- Display and analyse real time data on your PC. (Figure 2)
- Programming device settings via MPR-SW Software.
- Energy consumption between determined dates.

Reporting :

- Compensation report.
- Periodical values report
- Energy consumption report with tariffs. (Figure 3)
- Graphic report between determined dates. (Figure 4)
- Exporting all measured values to Ms Excel.
- Printing reports.

Minimum System Requirements:

- Windows 98/2000/XP
- 128 MB RAM (256 MB recommended)
- 60 MB HDD (200 MB recommended)
- CD-ROM drive
- USB interface or Ethernet Port

Product Code

MPR-SW Log 10	For Text Report (for MPR-60S and MPR-63 are FREE)
MPR-SW1	For Single Device (FREE)
MPR-SW5	Between 2-5 Devices
MPR-SW10	Between 6-10 Devices
MPR-SW15	Between 11-15 Devices
MPR-SW20	Between 16-20 Devices
MPR-SW20+	More than 20 Devices (FREE, IF 20+ DEVICES ARE USED IN A PROJECT)

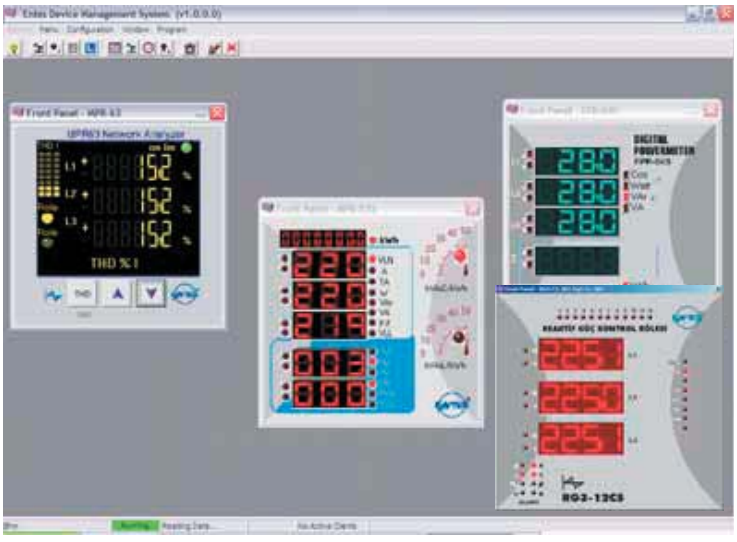


Figure 1: Front Panel Simulations

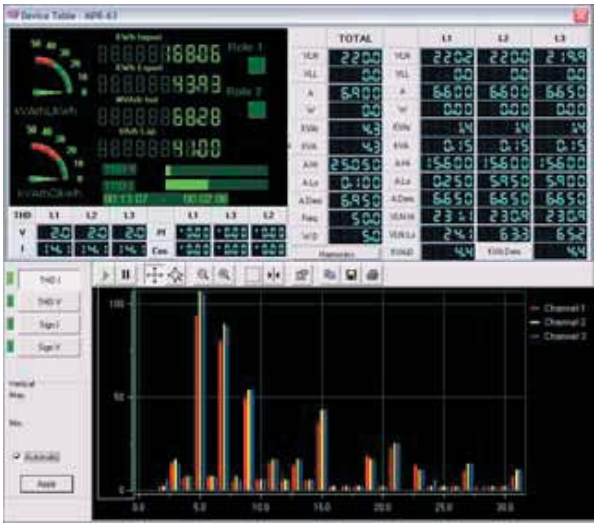


Figure 2: Data Display with Real Time

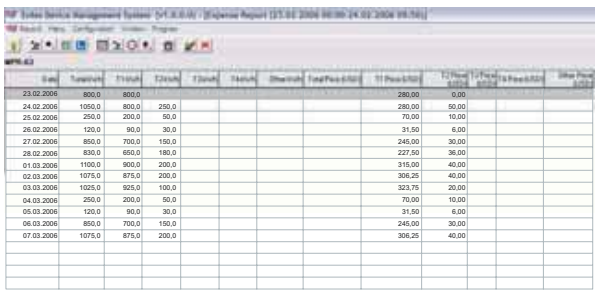


Figure 3: Energy Report with (4 Tariffs)

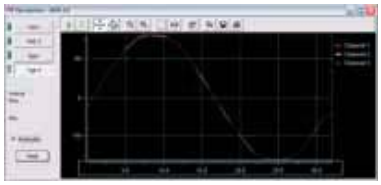


Figure 4: Graphic Reports

CONVERTERS FOR PC COMMUNICATION
EMG / RS-USB SERIES

EMG-10 / 12

EMG-10 / EMG-12 :

Ethernet / RS-485 Modbus Gateway
for communicating PC with MPR / EPR and EPM
series via Internet (WAN) and Intranet (LAN).

EMG-10 enables only one (1) online connection via internet / intranet.
However, EMG-12 enables max. 4 online connections via internet / intranet.

Category	Description
Network Protocols	TCP/IP, ARP, ICMP
Serial Ports	RS485-USB
Operation Modes	ModbusTCP/RTU ve Modbus Tunnel
Network interface	10/100 Mbps auto-negotiation
Serial Communication	Data bits : 5-6-7-8 data bits Stop Bits: 1-1.5-2 Characters Parity: Odd, even, none
Serial Interface	300-115200 bps
Supply	9-24V AC - 9-30V DC or (~75 mA) by the USB Port
Insulation and Protection	RS485 port: 500V Ethernet port: 1500V 15KV ESD Protection on USB Port 10/1000 µ transient pulse protection on RS-485 port (600W)

Serial Interface	
Interface	RS232, RS485 or RS422 modes can be defined by the firmware
Connector	DB25F serial port
Baud Rate	Can be defined between 300 bps and 115200 bps
Data Bit	7 or 8 data bits
Parity	Odd, even or none
Stop Bit	1 or 2
Control Signal	CTS/RTS (Hardware)
Flow Control	XON/XOFF (Software)
Network Interface	
Interface	10Base-T /100Base-TX Ethernet Port

- Adjust able data transfer speed options 10/100 Auto by the firmware.
- Adjust able Half / Full / Auto How control by the firmware

Connector	RJ45
Standarts	ARP, UDP, TCP, ICMP, TELNET, TFTP, AutoIP, DHCP, HTTP, SNMP
Other informations	
Auxillary supply	9-30 V DC / 9-24 V AC
Power consumption	Max. 1.5 W

EMG-20 :

Ethernet / RS-485 Modbus Gateway for
communicating PC with MPR / RG / EPR and
EPM-0x series via Internet (WAN) and Intranet (LAN

EMG-20

RS-USB2

USB Converter (RS-USB2) :

RS-485 / USB Converter for
communicating PC with MPR /
EPR and EPM-0x series.

RS-USB2
Technical Specifications

- USB 1.1 and USB 2.0 support
- 300 - 115.200 bps baud rate
- Auto direction flow control on RS485
- Minimum 3000 V DC isolation protection
- Activation LED
- Deriving the power from USB port and no need for an external supply.
- Auto baud rate detection
- ESD (Electro-static discharge) protection

DIGITAL VOLTMETERS
EVM / EVM-R Series

EVM-3C-96

EVM-3S-48

EVM-R3

EVM-3S-72

KEMA KEUR CE

Product Code		3-phase / Selectable	Max. Value	Min. Value	Output Contact	Flush Mount	Rail Mount	Pcs / Carton
EVM-3 -48	Voltmeter		●	●		●		20
EVM-3 -72	Voltmeter		●	●		●		16
EVM-3 -96	Voltmeter		●	●		●		12
EVM-3C -48	Voltmeter (with Output Contact)		●	●	●	●		20
EVM-3C -72	Voltmeter (with Output Contact)		●	●	●	●		16
EVM-3C -96	Voltmeter (with Output Contact)		●	●	●	●		12
EVM-3S -48	3-phase Selectable Voltmeter	●				●		20
EVM-3S -72	3-phase Selectable Voltmeter	●				●		16
EVM-3S -96	3-phase Selectable Voltmeter	●				●		12
EVM-R3	Voltmeter (Rail Mount)		●	●			●	16
EVM-R3C	Voltmeter with Output Contact (Rail Mount)		●	●	●		●	16
EVM-R3S	3-phase Selectable Voltmeter (Rail Mount)	●					●	16

- True RMS Measurement
- Non-flammable enclosure
- Double Insulation (⧈),
- Measurement Category III
- Terminal Connection

- Flush mounting with rear terminals
- IP40 (front panel)
- Ambient Operating Temperature : -5°C, +50°C

- IEC 61000-6-2, IEC 61000-6-4, IEC 61010-1

MODELS	Panel-Mount			Rail-Mount		
SPECIFICATIONS	**EVM-3**	**EVM-3C**	**EVM-3S**	**EVM-R3**	**EVM-R3C**	**EVM-R3S**
Electrical Parameters						
Operating Voltage (U_n)	230 V AC* ±10%, 50/60 Hz					
Network Type	Single-phase/ 2-wire		3-phase / 4-wire (Star)	Single-phase/ 2-wire		3-phase / 4-wire (Star)
Accuracy	1% ±1digit					
Measurement Ranges	10 - 600 V AC		10 - 300 V AC (L-N) 10 - 500 V AC (L-L)	10 - 600 V AC		10 - 300 V AC (L-N) 10 - 500 V AC (L-L)
Power Consumption	< 4 VA					
Burden	< 1 VA					
Output Contact	-	1 NO, 5 A 1250 VA	-	-	1 NO, 5 A 1250 VA	-
Instantaneous tripping	-	1,5 x setpoint	-	-	1,5 x setpoint	-
Hysteresis	-	4% x setpoint	-	-	4% x setpoint	-
Delay Time	-	0 - 99,9 sec	-	-	0 - 99,9 sec	-
Mechanical Parameters						
Dimensions	48x96 mm (PR 20) , 72x72 mm (PR 18) , 96x96 mm (PR 19)			DIN III Type-Rail Mount (PK20)		
Weight / each	0,3kg (PR20), 0,35kg (PR18), 0,4kg (PR19)			0,25 kg		
Quantity in 1 package	20pcs (PR20), 16pcs (PR18), 12pcs (PR19)			16 pcs		

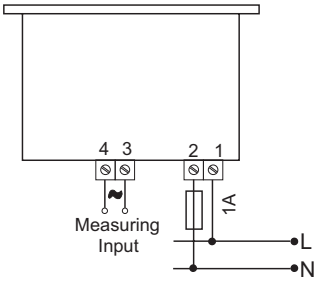
DIGITAL VOLTMETERS

EVM / EVM-R Series

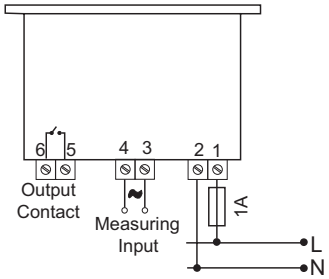
Connection Diagram

(PR19- 96x96mm)

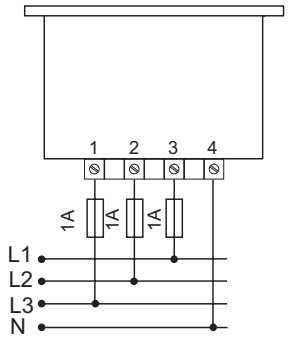
EVM-3



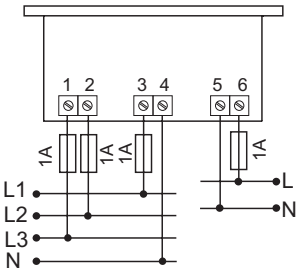
EVM-3C



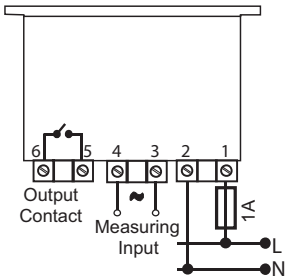
EVM-3S (72x72) (48x96)

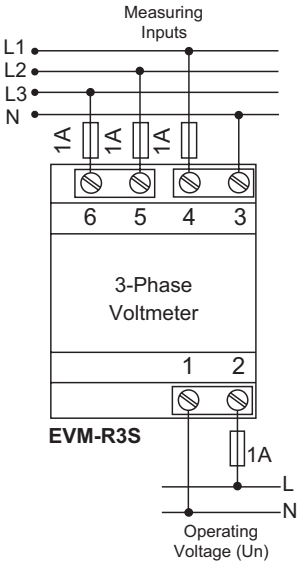


EVM-3S Slim-96

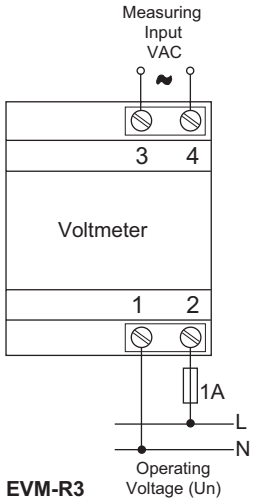


EVM-3C (48x96)

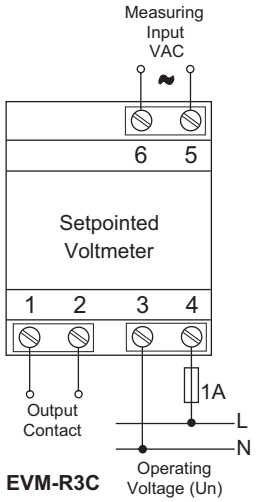




EVM-R3S

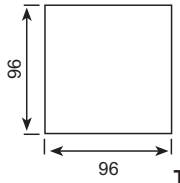


EVM-R3

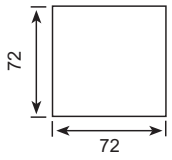


EVM-R3C

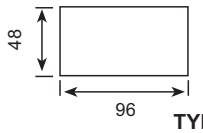
Dimensions



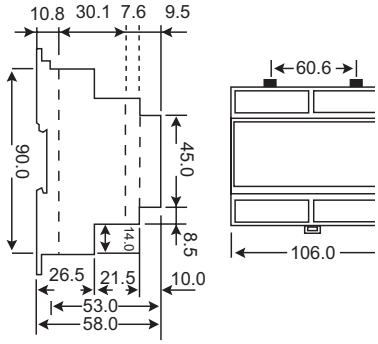
TYPE PR 19 (96x96)



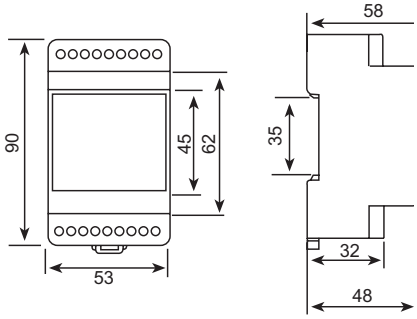
TYPE PR 18 (72x72)



TYPE PR 20 (48x96)



TYPE DIN / PK 26



TYPE PK 20

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

PROSWEDE-elab
Industrigatan 4, 212 14 Malmö Tel 040-38 15 70 Fax 040-38 15 78. Webbutik: www.proswede-elab.se

DIGITAL AMMETERS
EPM / EPM-R Series

ENTES
Current Transformer
or
CT-25
Max. 120 A
Current Transformer

EPM-R4D

EPM-4D

KEMA KEUR CE EPM-4P-96 (SLIM)

Product Code		CT-25	.../5A	Demand	Output Contact	Flush Mount	Rail Mount	Fixed Cur. Terminal	pcs / carton
EPM-4A -72	Direct Ammeter with CT-25 (210A) **(CT-25 included)**	●	●	●		●			16
EPM-4A -96	Direct Ammeter with CT-25 (210A) **(CT-25 included)**	●	●	●		●			12
EPM-4C -48	Ammeter (with Output Contact)	●	●	●	●	●			20
EPM-4C -72	Ammeter (with Output Contact)	●	●	●	●	●			16
EPM-4C -96	Ammeter (with Output Contact)	●	●	●	●	●			12
EPM-4C -OG -96	Ammeter with Output Contact (for MV applications)		●	●	●	●		●	12
EPM-4D -48	Ammeter		●	●		●			20
EPM-4D -72	Ammeter		●	●		●			16
EPM-4D -96	Ammeter		●	●		●			12
EPM-4P -96	Ammeter	●	●	●	●	●			12
EPM-R4C	Ammeter with Output Contact (Rail Mount)		●	●	●		●		16
EPM-R4D	Ammeter (Rail Mount)		●	●			●		16

Current TRANSFORMER (For ENTES panelmeters)

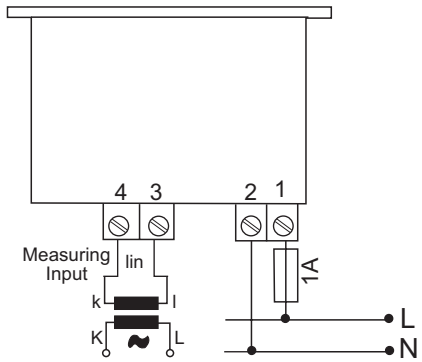
CT-25 — Primary : 210A / Secondary : 40mA, Inner Diameter : 17.8 mm, Outer Diameter: 47 mm — 72

- True RMS Measurement.
- Programmable Current Transformer Ratio (5...10.000/5A).
- Non-flammable enclosure.
- Double Insulation (⧈), Measurement Category III.
- Terminal Connection.
- Flush mounting with rear terminals.
- Ambient Operating Temperature: -5°C,+50°C.
- IEC 61000-6-2, IEC 61000-6-4, IEC 61010-1.

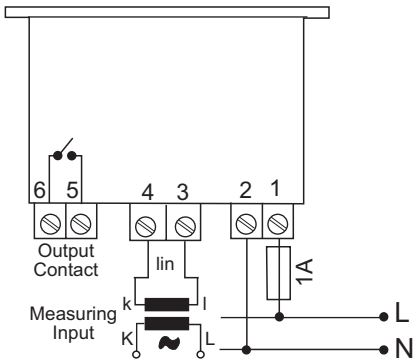
MODELS	Panel-Mounted			Rail-Mounted		
SPECIFICATIONS	EPM-4D	EPM-4C	EPM-4P	EPM-4A	EPM-R4D	EPM-R4C
Electrical Parameters						
Operating Voltage (U_n)	230 V AC* ±10%, 50/60 Hz					
Network Type	Single-phase / 2 wires					
Accuracy	1% ±1 digit					
Current Transformer Ratio	5...10000 / 5 A					
Measurement Input	0,05 - 5,5 A (with terminals); 2 - 120 A (with CT-25)				50 mA - 5,5 A	
Measurement Ranges	0,05 - 10 000 A (with X5 CT); 2 - 120 A (with CT-25)				50 mA - 10 000 A	
Power Consumption	< 4 VA					
Burden	< 1 VA					
Output Contact	-		1 NO, 5 A 1250 VA	1 C/O, 5 A 1250 VA	-	1 NO,5A 1250 VA
Pick-up Contact	1 NO, 5 A 1250 VA				-	
Instant Tripping	-	0,5 x spL*** 1,5 x spH****		1,5xSet Point	-	1,5xSet Point
Hysteresis	-	0-0,5 x Full scale		4%xSet Point	-	4%xSet Point
Delay Time	-	0 - 999,9 sec.			-	0 - 999,9 sec.
Demand Time (Average)	1- 60 min.					
Display	Red LED, 14 mm Height				Red LED, 10 mm Height	
Mechanical Parameters						
Dimensions	72x72 mm (PR18) Slim 96x96 mm (PR19)	72x72 mm (PR18) Slim 96x96 mm (PR19)	Slim 96x96 mm (PR19)	72x72 mm (PR18) 96x96 mm (PR19)	DIN III Type Rail Mount (PK20)	
Weight / each	0,35 kg (PR25), 0,3 kg (PR18), 0,35 kg (PR19)				0,3 kg	
Quantity in 1 package	16 pcs (PR18), 12 pcs (PR19)				16 pcs	

Connection Diagram

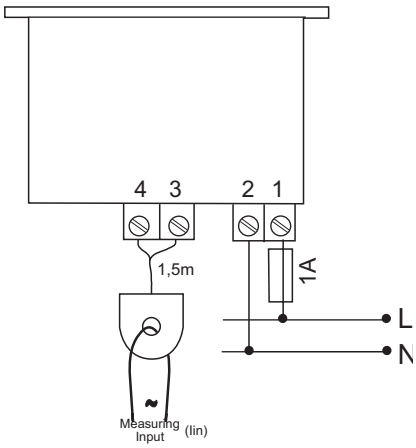
EPM-4D



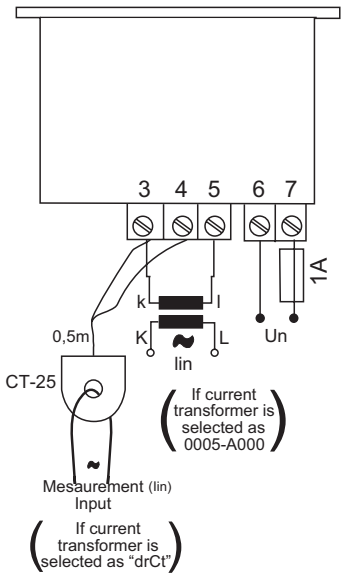
EPM-4C



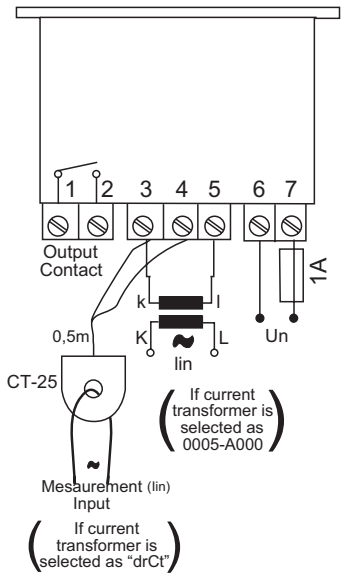
EPM-4A



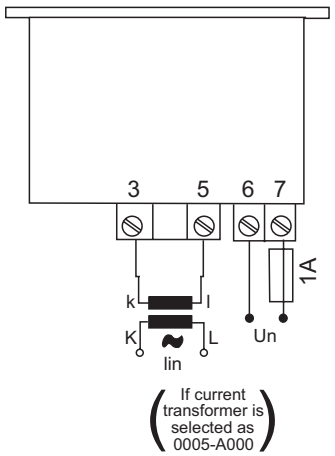
EPM-4A



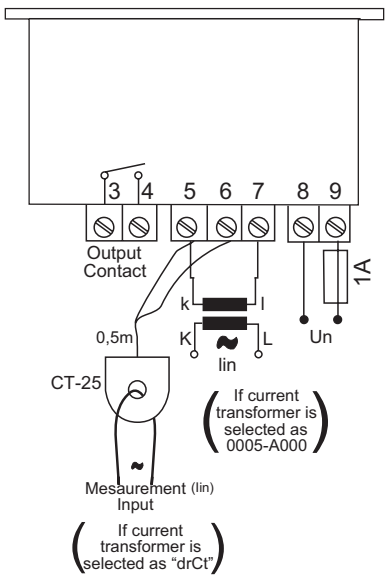
EPM-4C



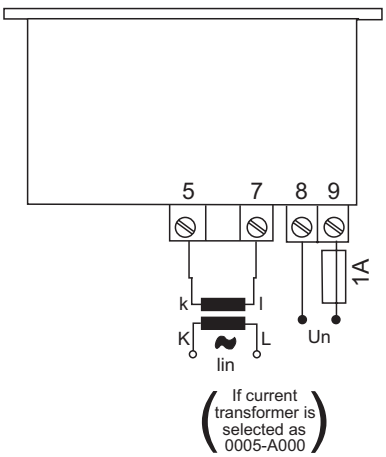
EPM-4D



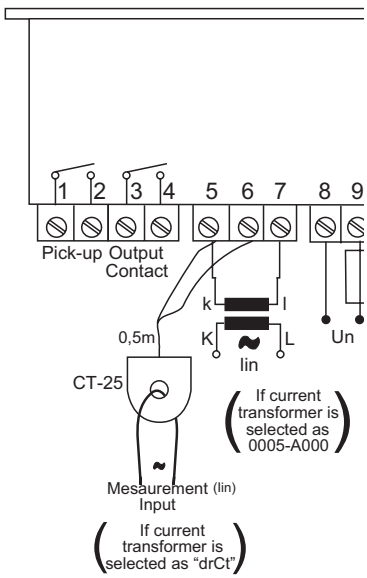
EPM-4C



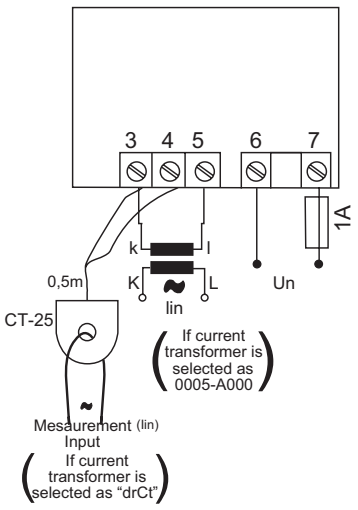
EPM-4D



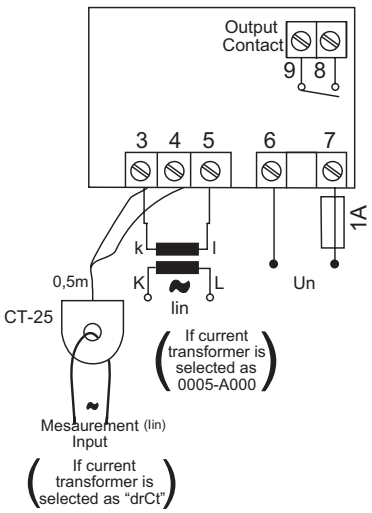
EPM-4P



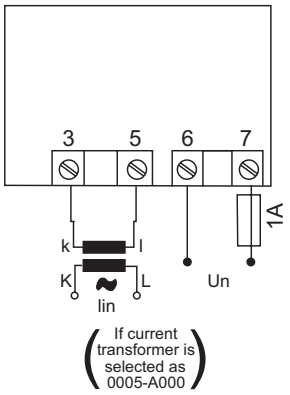
EPM-4A



EPM-4C



EPM-4D



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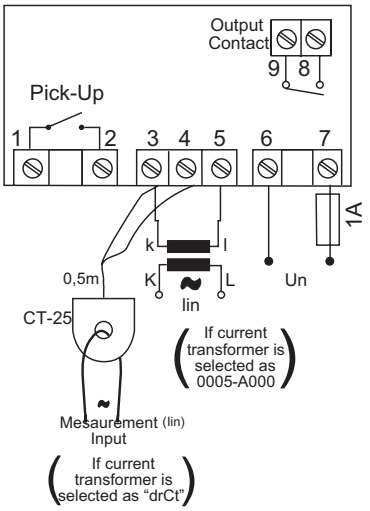
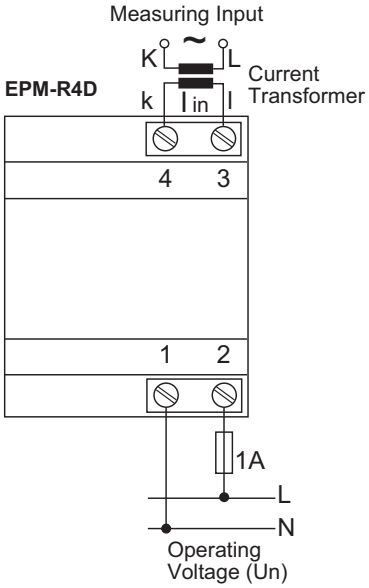
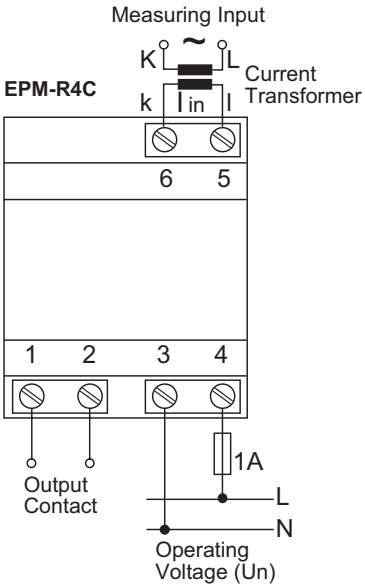


EPM-R4D

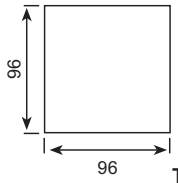


EPM-R4C

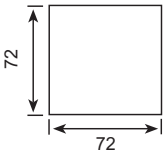


Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

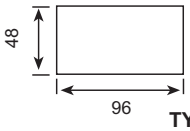
Dimensions



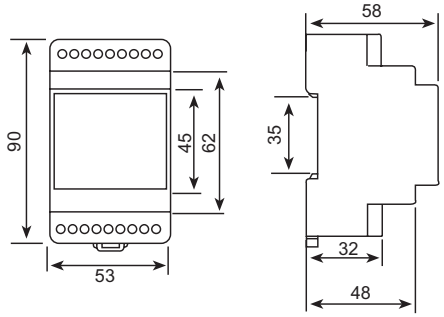
TYPE PR 19 (96x96)



TYPE PR 18 (72x72)



TYPE PR 20 (48x96)



TYPE PK 20

DIGITAL Cos METER ECR-3

DIGITAL FREQUENCY METER EFC-3

- Non-flammable enclosure
- Double Insulation (⧈)
- Measurement Category III
- Terminal Connection
- Flush mounting with rear terminals
- IP40 (front panel)
- IEC 61000-6-2
  IEC 61000-6-4
  IEC 61010-1

KEMA EUR CE **ECR-3-96**

EFC-3-72

Product Code

ECR-3 -72 ECR-3 -96	Cos Meter (0,1 Cap. - 0,1 ind.)
EFC-3 -72 EFC-3 -96	Frequencymeter (20-400 Hz.)

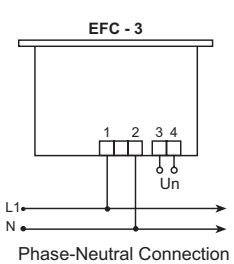
General

ECR-3
Digital cos -meter, measures cos of the power, drawn from the network, indicating whether the load is inductive or capacitive.

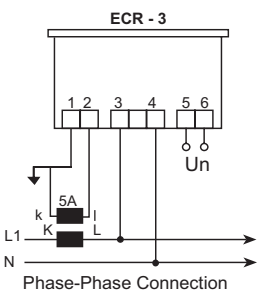
EFC-3
Digital frequencymeter, measures the frequency of the network.

MODELS	Frequencymeter	Cos meter
SPECIFICATIONS	**EFC-3**	**ECR-3**
Electrical Parameters		
Operating Voltage (Un)	230 V AC* ±10%; 50/60 Hz	
Accuracy	1% ±1 digit	2° ±1 digit
Current Transformer Ratio	-	... / 5A
Measurement Ranges	20 - 400 Hz	0,00 - 0,99 (Ind. - Cap.)
Operating Voltage	30 - 300 V	50 - 300 V
Operating Current	-	100 mA - 5,5 A
Operating Frequency	50/60 Hz	
Display	Red LED ; 14,2 mm Height	
Mechanical Parameters		
Ambient Operating Temperature	-5°C, +50°C	
Dimensions	72x72 mm (PR18), 96x96 mm (PR19), 48x96 mm (PR20)	
Weight / each	0,3 kg (PR18), 0,4 kg (PR19), 0,3 kg (PR20)	
Quantity in 1 package	16 pcs (PR18), 12 pcs (PR19), 20 pcs (PR20)	

Connection Diagram (PR19- 96x96mm)

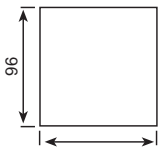


Phase-Neutral Connection

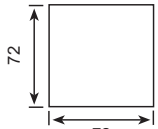


Phase-Phase Connection

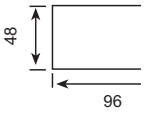
Dimensions



TYPE PR 19 (96x96)



TYPE PR 18 (72x72)



TYPE PR 20 (4

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

CURRENT TRANSDUCER
TA-111 / TA-112

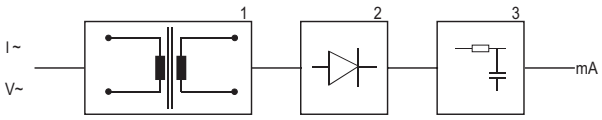
VOLTAGE TRANSDUCER
TV-111

General

Transducers convert electrical signal to the analog signal. They are used in control and automation systems.

TA-111/TA-112 current transducers and TV-111 voltage transducer are self-powered. Supply voltage is not applied. Output current is 0-20 mA.

The transformer, which is used in the input circuits of TA-111 / TA-112 and TV-111 provides galvanic isolation between the input and output signals.



TV-111
Voltage Transducer

TA-111
Current Transducer

CE

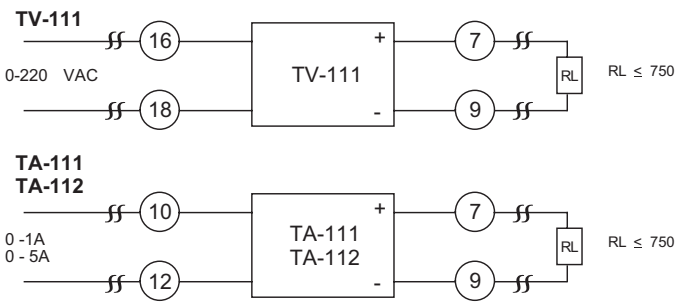
pcs / carton

Product Code

TA-111	Input : 0-1A AC, Output : 0-20mA DC	16
TA-112	Input : 0-5A AC, Output : 0-20mA DC	16
TV-111	Input : 0-220V AC, Output : 0-20mA DC	16

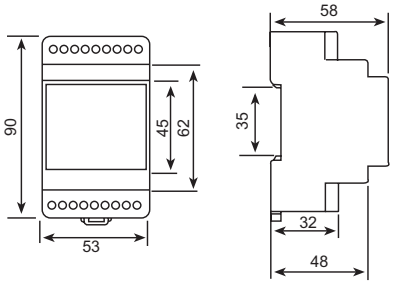
MODELS	TA-111	TA-112	TV-111
SPECIFICATIONS			
Electrical Features			
Measurement Input	0 - 1 A AC	0 - 5 A AC	0 - 220 V AC
Frequency	50 Hz		
Power Consumption	3 VA		4 VA
Over Load Capacity	$1,5xI_n$ (continuous) 20xIn (1sec.) In =1 A AC	$1,5xI_n$ (continuous) 20xIn (1sec.) In =5 A AC	$1,2xU_n$ (continuous) 2xUn (1sec.) Un = 220 V AC
Output Signal	0-20 mA DC		
Linear Output Range	(0,05...1,1) x In		(0,2...1,1) x Un
Load(RL)	0 - 750		
Transmission Error	% 0,5 (Full Scale)		
Response Time	< 300 msec.		
Mechanical Features			
Equipment Protection	Double Insulation (⧈)		
Operating Temperature	-5°C, +50°C		
Humidity	≤ % 75		
Degree of Protection	IP 40 (front panel)		
Connection	Rail-mounted		
Dimension	DIN III Type - Rail mount (PK20*)		
Weight	0,4 kg		0,35 kg
Quantity in 1 Package	16 pcs		

Connection Diagram



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.

Dimensions



TYPE PK 20

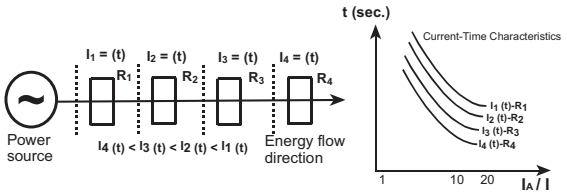
OVERCURRENT PROTECTION RELAYS
CKR Series

CKR-93T (144x144mm)

CKR-81T-96 (96x96mm)

General

Microcontroller based CKR series overcurrent relays combine both inverse time and independent time relays in one unit. These relays are used for protecting transformers, motors, generators, and power lines in energy distribution systems against short circuits and grounding faults.
The most important point to achieve the uppermost protection is to apply “selective protection”. The main purpose of selective protection is locating and disconnecting the faulty circuit from the network as soon as possible but leaving the rest of the network active.
The accurate protection by the inverse-time overcurrent relays can be accomplished with the following conditions :
1) Relays having the same operation characteristics should be used in series with each other.
2) Tripping intervals of the relays used within the system must be adjusted in the form of “current/time steps”.
Current dependent tripping-time adjustment of the relays should be done in such a way that the “current/time steps” should be reduced as getting away from the source.
Thus, the relay at the end of the line (R4 in the following figure) should have the shortest tripping time.
This situation can be best observed from the schematics and current-time characteristics below:



A. CKR- 9XX series have the following I/t characteristics. According to IEC-255, BS-142 these are:
a - Normal Inverse
b - Very Inverse
c - Extremely Inverse
d - Long Time Inverse
e - Independent Time 1 (2.5 sec.)
f - Independent Time 2 (5 sec.)
g - Independent Time 3 (10 sec.)
h - Independent Time 4 (15 sec.)
The instantaneous tripping current, the time multiplication factor, and current-time characteristics adjustments both for the phases and neutral can be selected separately.

- Non-flammable enclosure
- Double Insulation (⧈),
- Measurement Category III
- Terminal Connection
- Flush mounting with rear terminals

CKR SERIES
- IP40 (front panel)
- IEC 60255-3
  IEC 60255-6
  IEC 529

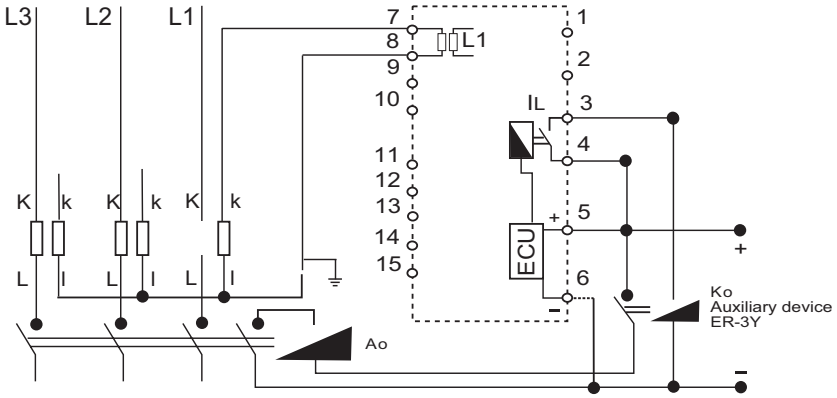
CKS SERIES
- IP51 (front panel)
- IEC 60255-3
  IEC 60255-6
  IEC 60870-5
  IEC 60529

MODELS

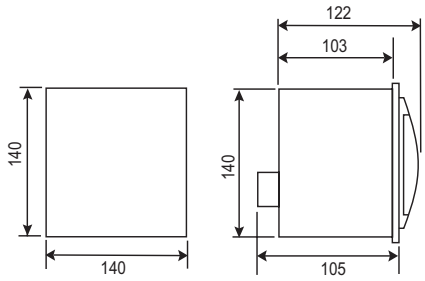
SPECIFICATIONS	CKR-81T-96	CKR-91T	CKR-92T	CKR-93T	CKR-94T
Functions					
Single-phase protection	●	●			●
Two-phase protection			●		
Three-phase protection				●	
Earth fault protection	●	●	●	●	●
Time and current setting					
Overcurrent pick-up I>	0.2 - 3.35 x In, Step 0.25				
Overcurrent instant I>>	2 - 17 x (I>), Step 1				
Definite time	2.5, 5, 15 sec. 0.1-1 Step 0.1				
Inverse time	According IEC255, ANSI (normal, very, extremely, longtime, moderately) **CKR-9XT series don't have moderately inverse time.**				
Time multiplier for curves	0.1-1, Step 0.1				
Electrical Parameters					
Operating Voltage(Un)	24 V DC, 220 V DC 230VAC±10% 50/60 Hz	24 V DC, 85-265 V AC / DC ±10% 50/60 Hz			
Operating Current(In)	1 A (earth), 5 A (phase)				
Power Consumption	< 2 VA				
Burden	< 3 VA				
Relay output	1 NO for phase 1 NO for neutral 10A/1400VA				
Accuracy	Current 5% In or Iset; Time 7,5% or ±40 msec.				
Mechanical Parameters					
Operating Temperature	-5°C, +55°C				
Dimension	96x96mm (PR24)	144x144mm (PR17)			
Packing Weight	0,6 kg	1,3 kg			
Quantity in 1 package	16 pcs	4 pcs			

Connection Diagram

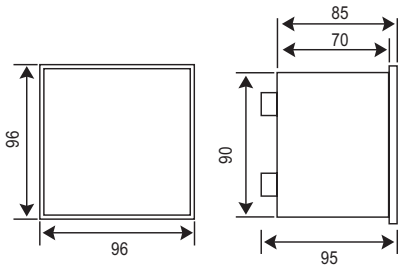
A- Single Phase
Overcurrent Protection Device



Dimensions

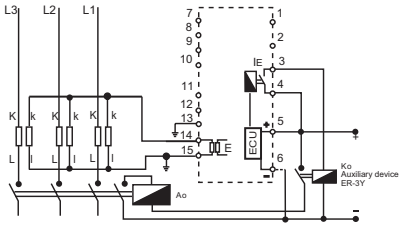


TYPE PR 17

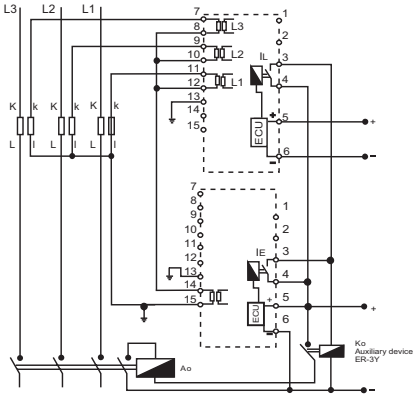


TYPE PR 24

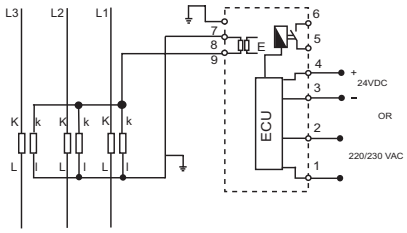
B1- Earth Fault
Overcurrent Protection Device



B2- Earth Fault
Overcurrent Protection Device

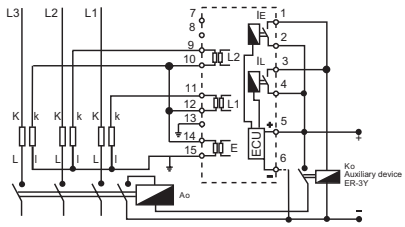


B3- Earth Fault Overcurrent Protection Device

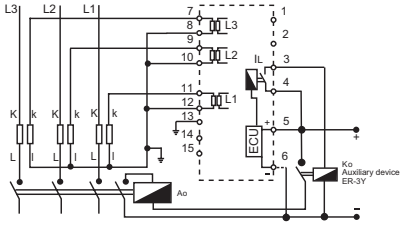


The shown diagrams are only for typical application purposes.

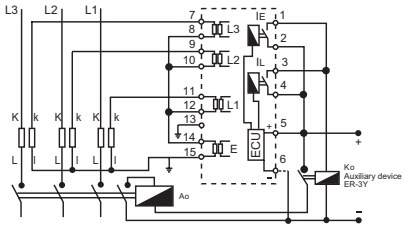
C-Two Phase and Earth Fault
Overcurrent Protection Device



D-Three Phase Overcurrent
Protection Device



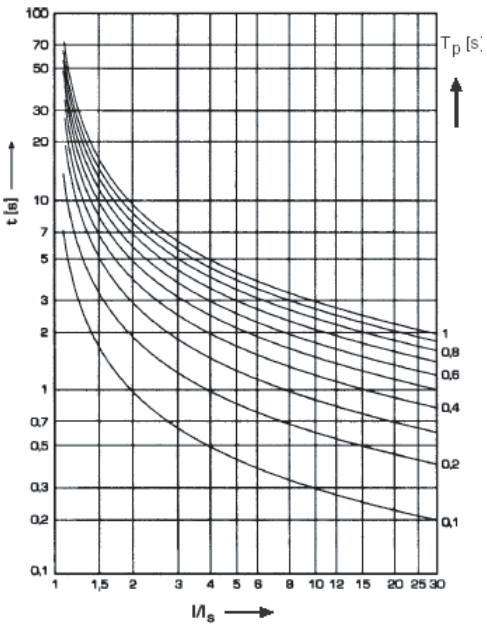
E-Three Phase and Earth Fault
Overcurrent Protection Device

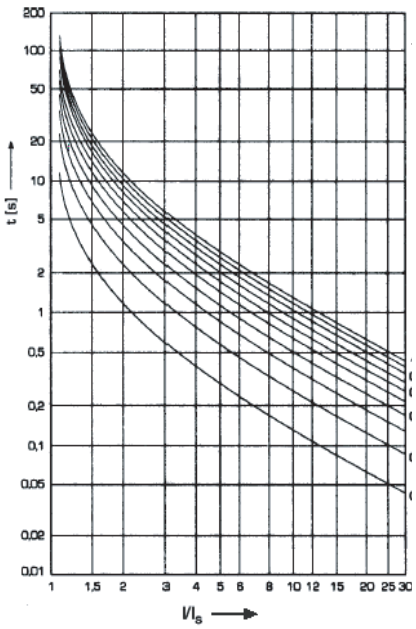


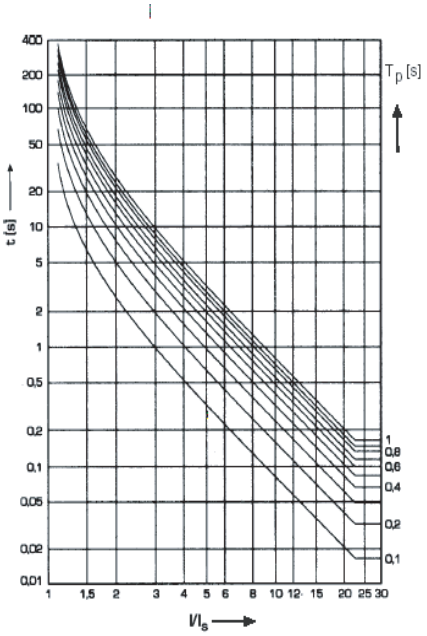
Product Code

		pcs / carton
CKR-93T	3 Phase + 1 Earth (Adjustable Inverse and Fixed Times for Phase & Earth) 85-265 VAC / DC	4
CKR-92T	2 Phase + 1 Earth (" " " " " " " " " ")	4

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr.







Normal inverse : $t = \frac{0.14}{(I/I_s)^{0.02} - 1}$. Tp [s]

Very inverse : $t = \frac{13.5}{(I/I_s) - 1}$. T_p [s]

Extremely inverse : $t = \frac{80}{(I/I_s)^2 - 1}$. T_p [s]

Normal Inverse (Tp= 1.0)

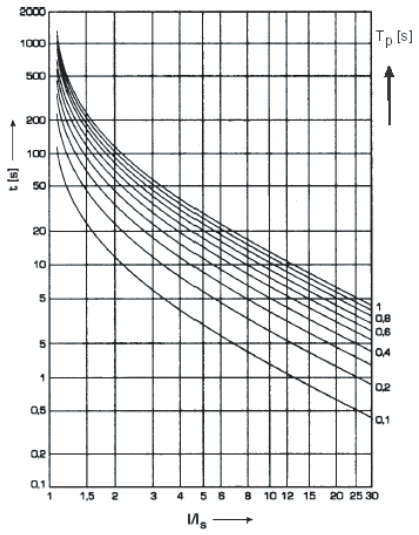
I/Is	2	3	4	5	6	8	10	15	20
t(sec)	10	6.3	4.98	4.28	3.84	3.3	2.97	2.52	2.27

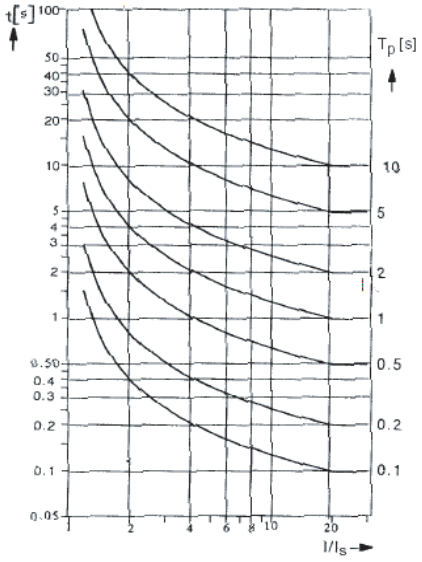
Very Inverse (Tp= 1.0)

I/Is	2	3	4	5	6	8	10	15	20
t(sec)	13.5	6.75	4.5	3.38	2.7	1.93	1.5	0.96	0.71

Extremely Inverse (Tp=1.0)

I/Is	2	3	4	5	6	8	10	15	20
t(sec)	26.7	10	5.33	3.33	2.29	1.27	0.81	0.36	0.2





Long Time inverse $t = \frac{120}{(I/I_s)^1 - 1}$. Tp [s]

Moderately inverse $t = \left(\frac{0.054196}{(I/I_s)^{0.02} - 1} + 0.09328\right)$. Tp [s]

Long Time (Tp= 1.0)

I/Is	2	3	4	5	6	8	10	15	20
t(sec)	120	60	40	30	24	17.1	13.3	8.57	6.32

Moderately Inverse (Tp= 1.0)

I/Is	2	3	4	5	6	8	10	15	20
t(sec)	3.98	2.53	2.02	1.75	1.58	1.37	1.24	1.07	0.97

Tp: Time multiplier

LOW VOLTAGE POWER CAPACITORS

C10 / C50 / CF Series

THREE-PHASE POWER CAPACITORS (400V AC)

C10*	POWER (kVAr)	DIMENSION DxH (mm.)	PCS PER BOX	WEIGHT PER PACKAGE (Kg.)
ENT.C10-400-1,5	1,5	55x165	21	9
ENT.C10-400-2,5	2,5	55x165	21	9
ENT.C10-400-5	5	65x200	14	9
ENT.C10-400-7,5	7,5	75x215	12	9
ENT.C10-400-10	10	75x255	12	9

C50*	POWER (kVAr)	DIMENSION DxH (mm.)	PCS PER BOX	WEIGHT PER PACKAGE (Kg.)
ENT.C50-400-10	10	75x200	6	10
ENT.C50-400-12,5	12,5	75x200	6	10
ENT.C50-400-15	15	85x200	6	10
ENT.C50-400-20	20	90x200	6	10
ENT.C50-400-25	25	100x200	6	10
ENT.C50-400-30	30	100x240	6	10

SINGLE PHASE POWER CAPACITORS

CF*	POWER (kVAr)		DIMENSION DxH (mm.)	PCS PER BOX	WEIGHT PER PACKAGE (Kg.)
	400V AC	230V AC			
ENT.CF-400-2,5	2,5	0,83	55x132	25	9
ENT.CF-400-4,17	4,17	1,38	60x137	25	9

- **Long Life Expectancy 130.000 hours** (C50 mo
- **Self Healing**
- **Smaller Dimensions**
- **Lower Dielectric Loss**

TECHNICAL FEATURES	C10	C50	CF
Life Expectancy	80.000 hours	130.000 hours	30.000 hours
Rated Frequency	50/60Hz	50/60Hz	50/60Hz
Capacitance Tolerance	-%5+%10	-%5+%10	-%5+%10
Dielectric Loss	0,3 W/kVar	0,2 W/kVar	0,4 W/kVar
Altitude	2000 m	2000 m	2000 m
Test Voltage (Between Terminals)	2,15 x Un, AC 2 sec.	2,15 x Un, AC 2 sec.	2,15 x Un, AC 2 sec.
Test Voltage (Between Terminals and Case)	3 KV, AC 10 sec. (Un 660 V)	3 KV, AC 10 sec. (Un 660 V)	3 KV, AC 10 sec.
Rated Temperature	-25+55°C	-25+55°C	-25+55°C
Max. Overvoltage	1,1xUn	1,1xUn	1,1xUn
Max. Overload In	2 x In	4 x In	2 x In
Protection Class	IP30	IP20	IP00
Discharge Resistance	Internal (75V after 3 min.)	Internal (50V after 1 min.)	—
Standards	IEC 60831-1/2	IEC 60831-1/2	IEC 60831-1/2

Discharge coil must be used in automatic compensation in case switch-on time is under 1 minute.

	OPERATING VOLTAGE*
C10	230V AC
	400V AC
	415V AC
	450V AC
C50	400V AC
	415V AC
	450V AC
	525V AC
	690V AC
CF	230V AC
	400V AC
	415V AC
	450V AC
	500V AC
	550V AC

* Different operating voltages are available upon request. Please notify VOLTAGE (□□□) with the order.

* Entes recommends capacitors with ≥450V AC in networks with Harmonics.

L.V. CURRENT TRANSFORMERS

ENT.B

ENT.30

ENT.60

ENT.80

ENT.100

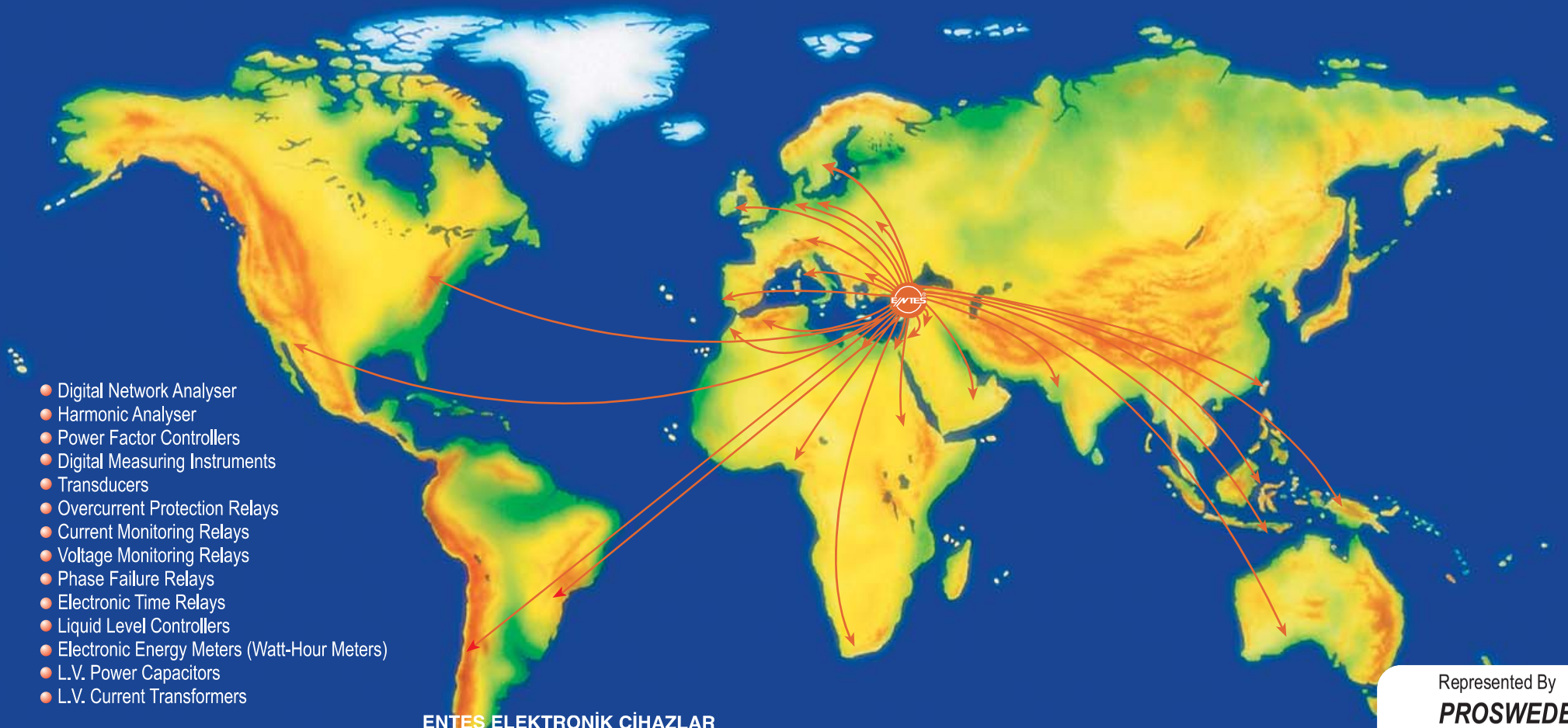
TYPE	PRIMARY CURRENT(A)	NOMINAL POWER (VA)
ENT.B	5 - 10 - 15	5
		10
		15
ENT.B	20 - 25 - 30 - 40 50 - 60 - 75 - 80 100 - 125 - 150	5
		10
		15
ENT.30	30 - 40 - 50 - 75 - 100 - 150	5
ENT.30	200	5
		10
ENT.30	250 - 300	5
		10
		15
ENT.40	400 - 500 - 600	5
		10
		15
ENT.60	750 - 800	10
		15
		30
ENT.60	1000 - 1250	10
		15
		30
ENT.80	1500 - 1600	15
		30
ENT.100	2000	15
		30
ENT.100	2500	15
		30
ENT.100	3000	15
		30
ENT.100	3200	15
		30
ENT.100	4000	30
ENT.100	5000	30

L.V. CURRENT TRANSFORMER (for ENTES Digital Measurement Devices)	TYPE	FEATURES	SUPPORTED ENTES PRODUCTS
	CT-25	**Primary Current :** 210 A **Ratio :** 1/2500, Class:1 **Inner Diameter :** 17.8 mm **Outer Diameter :** 47 mm	**EPM-4D-72 / EPM-4D-96** **EPM-4C-72 / EPM-4C-96** **EPM-4P-96** **EPM-4A-72** **EPM-4AC-72**

CE

Exporting Worldwide

- ASIA
- AUSTRALIA
- NORTH AMERICA
- AFRICA
- EUROPE
- SOUTH AMERICA



- Digital Network Analyser
- Harmonic Analyser
- Power Factor Controllers
- Digital Measuring Instruments
- Transducers
- Overcurrent Protection Relays
- Current Monitoring Relays
- Voltage Monitoring Relays
- Phase Failure Relays
- Electronic Time Relays
- Liquid Level Controllers
- Electronic Energy Meters (Watt-Hour Meters)
- L.V. Power Capacitors
- L.V. Current Transformers

KEMA KEUR CE ISO 9001

FE 25.12.08 Print Date: 30.12.08

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ÝSTANBUL / TÜRKiYE

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